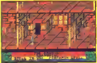
COMMODORE 64 PROGRAMMER OF 1985–IS IT YOU?

YOUR 64

APRIL 1985 95p No. 8

TRICKS 'N' TIPS

STAFF OF KARNATH



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Y64 CHALLENGE

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RAID ON BUNGLING BAY

A Guide For Games Players

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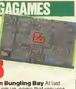
Y64 MENU

MEGAGAMES



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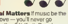

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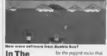


New wave software from Bubble Bus?

In The Swim?

For those with watery tastes Bubble Bus Software has released *Aqua Race* — a game written in machine code for the CBM 64 Complete with authentic 3D graphics (it says here) your task is to steer the racer around the course on-screen watching out all the while for the jagged rocks that threten to send your vessel down to Davy Jones Locker!

There s 20 different courses to race around and Bubble Bus is claiming that the music accompannying the game has been especially written for it (*Wow! Ed*) You can catch Bubble Bus on (0732) 355962

Buy This!

Ten software houses are joining forces to produce the computer games equivalent to *Band Aid's* top selling single *Feed the World*

Soft Aid features ten of the best selling games from companies like Quicksilva Activision Ocean and Silversoft titles so far include *Fred Chinese Juggler Pyramid* and *Worse Things Happen At Sea*

Soft Aid will be available in March The tape will cost a mere £2 99 and all proceeds will go towards the Ethiopian Famine Appeal If you want to hurry the proceeds along don't bother Rod on (0703) 37497 just rush out and buy the tape!

Tek's Ducas+ — a reset button with a difference!

Versatile Reset

The Ducas+ is a new multi-purpose reset switch for the 64 on sale from Tek Services

As well as being fitted with a cold start reset button — to hoist the computer out of crashes — the Ducas+ is also kitted out with an audio/digital selector Switch the selector to audio and soundtracks or musical effects can be recorded directly as games are being played flip to the digital position and security back-ups are as easy as pie

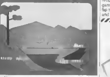
The Ducas+ is supplied as standard with both five- and six pin DIN plugs for compatibility with the two sockets on the 64 A third cable also with five-pin DIN is wired to suit most makes of cassette player

For a mere £15 95 you can purchase the Ducas+ along with its renew cassette and instruction booklet from Tek Services 16a Appolo Street Erith Kent DAS 2AL Telephone enquiries can be made on (0322) 347232

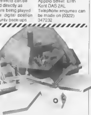
Go on, Crack It!

Osprey a game developed in conjunction with the RSPB and designed to illustrate the complexities of wildlife conservation has just been nominated for the Computer Trades Association Educational Program of the Year award

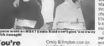
With teams of wardens at your disposal the aim of the game is to ensure the survival of the Osprey by avoiding such real life hazards as egg thieves tourists and adverse weather conditions



Produced by Bourne Education Software *Osprey* is now available for the 64 and will set you back £9 95 for the cassette version and £11 95 on disk Bird-lovers should get on the line with hopeful award winners Bourne on (0794) 523301



Logical with LOGO, it's Valient's Turtle.



Anyone want an MSX? Eddie Kidd can't give 'em away quick enough!

You're Kidding!

Can you jump 25 cars on your CBM 64? Well Craig Billington can on his ZX Spectrum and Jason Ellis cleared 35 cars on his BBC B!

The *Eddie Kidd Jump Challenge* competitions have been so successful that Martech has decided to run a third compo and that closes on 31st May 1985 Each of the three winners may choose between an Elswick Falcon BMX bike a Toshiba MSX micro or a Philips TV

C mon all you 64 owners out there — let s see if you can outdo the Speccy/BBC users Give Martech a ring on (0323) 768456 and get those entries in fast

Souped-up Turtle!

Valient Designs Ltd has produced a new remote controlled turtle for use in education that can be interfaced with the CBM 64 Valient is also promising interface software to enable its turtle to be at the beck and call of the more popular versions of LOGO as well as other turtle graphics programs

The Valient Turtle has two independent stepper motors and is designed to move in units of one centimetre It s also got the facility to draw smooth circles and arcs

Sold as a package complete with Turtle instruction mannual batteries communicator pen power adaptor and software the Valient Turtle will set you back £175 For further information contact Valient Designs on (0532) 710431

Currah Speech 64

Speech Synthesizer

[illegible] Speech 64 synthesizer and powerful amplifier uses the popular SP/0256 AL2 speech chip [illegible] vocabulary. It has a text to speech interpreter for ease of speech output creation. Everything [illegible] in normal English without special control codes or characters it is therefore extremely easy [illegible] the words is completely user transparent and the computer can carry on its normal running of [illegible] speech chip is talking

Speech Synthesis

The Commodore 64 speech synthesis utilises parts of the spoken word known as allophones. These are actual sounds that go to make up speech. The SP 0256 AL2 allophone speech synthesis technique provides the ability to synthesize an almost unlimited vocabulary. Fifty nine discrete speech sounds (allophones) and five pauses are stored in the speech chip's internal ROM.

Text to Speech

Although there are only 26 letters in the alphabet letters have a totally different sound when used in different words. For example the a in Hay is much longer and softer than in Hat. When you speak you automatically make adjustments because you know how a word should sound. Not quite so easy with a computer.

The 8K byte Read Only Memory contains all the instructions necessary for the SPEECH 64 to perform all of its more advanced functions including *Key Voicing * Text to speech conversion * Operating system. Having all the software on ROM means that Speech 64 is ready to use as soon as the computer is switched on. Unlike RAM, ROM is non volatile, it retains the information inside even when the power is turned off.

The 500 gate Semi custom chip was developed in close co-operation with General Instrument Microelectronics and looks after all the hardware functions ensuring that the SPEECH 64 and your computer communicate properly.

Output via the T.V.

Analogue components together perform the functions of turning the speech output from the SP/0256 AL2 into audio level signals that can be fed into the C64 for output to the TV. They filter out the undesirable low and high frequency signals in the speech output and also amplify the signal to a suitable level.

CURRAH

dk'tronics

Saffron Walden Essex CB11 3AQ
Tel (0799) 26350 10 lines

New Basic Commands

There are 5 new Basic Commands which control all the functions of the interface. Making the Synthesizer very easy to use. You can even choose from a high or low voice and individual allophones can be intoned to add character. Or use the synthesizer to create voice like sound affects.

```
10 SAY  HELLO
```

The above is an example of the Syntax for entering speech into the computer and shows how simple it is to use.

The instruction book gives comprehensive details and examples of how to use the interface both from machine code and basic.

How to Order

The Currah Speech 64 costs only £29.95. You can obtain your synthesizer through any good computer store or by completing the order form and returning it to

dk tronics Limited, Shire Hill, Saffron Walden, Essex OR by telephone quoting your Barclaycard or Access number. Orders normally despatched within 24 hours.

Please rush me

[QTY] Commodore Speech 64 at £29.95 + £1.25 p&p
I enclose cheque/PO/Cash for Total £
or debit my Access/Barclaycard No
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Signature
Name
Address

OPEN ACCESS

Get into print with SMC.

The Print Connection?

SMC Supplies has announced the availability of the Commodore Connexion — a joint printer cable and software product enabling the 64 to link up to any Centronics printer.

The Commodore Connexion offers two modes of operation: the first providing carriage control facilities for program listings and wordprocessing while the second allows characters to be printed direct.

This tape-based program, located behind the kernal ROM, doesn't interfere with user memory and can be transferred to disk if required.

The Commodore Connexion is available from any decent computer store for £19.95. Further details will be forthcoming from SMC on 01-441 1282.

Screenplay show off its new wares (of the soft kind!).

Win Compo — Lose Shirt!

Fancy a trip to Las Vegas — course you do. C'mon, admit it, you wouldn't say no to a freebie flight to 'gamblin city' would you? Well here's your opportunity!

Screenplay, the games software publisher, is offering a free trip as part of its special promotion on a whole list of games: *Asylum*, *Dunzhin*, *Pro Black Jack*, *Trivia Arcade* and *Pogo Joe*.

So, how do you enter? Well, the fact is you don't even have to buy a game — although Screenplay would probably much prefer it if you did. As it is, just ask your local computer dealer for a draw ticket ... but the *Y64* advice is don't hold your breath while you're waiting for your flight ticket!

ARCADE ACE

Send your tricks and tactics to Arcade Ace
Your 64, 14 Rathbone Place,
London W1P 1DE

OK people, so you think you can master arcade games do you? Well, it doesn't really matter 'cause I'm going to show you how it's done anyway!

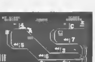
I'll be tackling two games this time — Ocean's *Kong Strikes Back* and *Black Thunder*. My tips for the first three levels of *Kong Strikes Back* are explained visually (hence the screenshots!) but for some useful tactics on *Black Thunder* ... read on!

First off, I'd say that in my humble opinion keyboard control is infinitely preferable to joystick. It's also worth noting that if anything's in line with you — even on a road further on — you can still blast them once they get close.

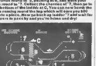
The enemy missiles, on the other hand, need a little bit more attention. You have to let them get close, take a side road and decelerate ... and then accelerate for all your worth. This'll need a little practise, but you should find the missile will have pulled in front of you ... and that's your cue to zap it!

Helicopters are sneaky critters — but the way to avoid them is to use the decelerate/accelerate routine — but this time fire your missile straight up! Another potential danger is from the UFOs but if you use the ol' decelerate/accelerate routine again, it'll end up in front and you can shoot it out of the sky!

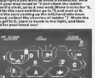
Well, that's it for this month. I'm off to snap a few joysticks. But remember, if you've got any problems getting through any level of any game for the 64 or you'd like to share your tricks and tactics with rest of the *Y64* populace write to Arcade Ace, Your 64, 14 Rathbone Place, London W1P 1DE.



To start off, go right and collect the cherries at '1, wait under '2 until the cars go overhead, and then climb the ladder. Once the cars have passed by, go to '3 and head for '4. Wait at A until the cars go overhead, then climb ladder '4 and sit tight. Continue round to '5, pausing at B, and work your way round to '7. Collect the cherries at '7, then go to the bottom of the ladder at C. You can now bomb the cars coming round the top which will earn you 500 points a piece. Now go back up ladder '7 and wait for the cars to pass by and you're home and dry!



As soon as the action starts, ease your joystick to the top right if you want to avoid a headache! Now work your way round to '2 and climb the ladder. When it's clear, go to A and wait. Make tracks for '5, wait for the cars and then go to '6 and wait at B. Once the cars coming up the left hand side have passed, collect the cherries at ladder '7. When the cars get to C, start to bomb to the right, and then head for your loved one!



Although fairly simple to complete, you'll not be using your bombs to gain extra points — you'll need them to survive! First off, climb ladder '1 and wait. Then, head for '3, waiting briefly at '2 and A (for obvious reasons!). Now go to B and bomb the cars at C. Run for '5 as fast as you can (you may need to stop at '4), climb ladder '5 and wait ... then run for '6 and climb the ladder. Now, rush off to D and, as soon as the spring goes down, sip up ladder '7 and return to D. You can then head for home. Good luck on the fourth level ... you're on your own now!

OPEN ACCESS

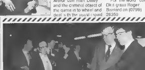
Nice Little Earner?

Dk Troniks in conjunction with Thames TV has just released *Minder* — based as you've probably already guessed on the TV series starring Terry and Arfur! We're promised the game will be as disreputable as the characters involved and that it'll feature such infamous locations as the lock up Terry's flat and Dave's Winchester Club

You take the part of Arthur con man Daley and the criminal object of the game is to wheel and deal with the usual crowd of shady characters You're whisked around in the trusty Merc and the *Minder* theme tune plays all the while — just in case you'd forgotten which game you're playing

On your nefarious way you're quite likely to bump into Terry Dave the barman and poor old Ricott who's lot is definitely not a happy one The game is fully interactive and is likely to answer every question you put to it — truthfully or not!

For the word contact Dk's grass Roger Barnard on (0799) 26350



MP Robert Dunn finds the Hi Tech exhibition an education!

Educational Exhibitionists

The Hi Technology and Computers in Education exhibition held at the Barbican Centre London earlier this year proved to be a great success The exhibition was designed to bring education and industry together and was opened by Robert Dunn MP Undersecretary of State for the Department of Education and Science

Over 290 exhibitors managed to make it on the day — but perhaps the biggest surprise was the public turnout even to the point where the seminar groups held were turning away prospective listeners! Commodore International was there of course proudly demonstrating its educational software on the 64 as well as the C16 and Plus 4 computers One particular program worth a second look is Commodore's LOGO priced at £34 95

Despite the Under 18s not admitted ban — which is a bit of a shock when you consider that they're the very people who'll be taught by computer — the Hi-Technology and Computers in Education exhibition will probably be around next year

Finger Trouble

Sorry folks Apologies to all those who've spent hours trying to get through to AS Denby (Open Access *Y64* issue 6) about the reset button We unfortunately omitted to mention that the phone number (0789 763502) would only be answered between 4 pm and 10 pm

Rocky Horror Returns!

CRL's about to release *The Rocky Horror Show* as a fully animated graphic adventure claimed to be programmed in 'wonderful rockyramascope' — whatever that is?

CRL tells us that the game is full of laughs Transylvanian parties romance thrills and chills — but it's keeping the plot of the game well under its cape for the meantime All the company will guarantee is that it's going to be the only non-sexist program available as you can take the place of either Janet or Brad the two lead characters Wow!

Hassle CRL on 01-533 2918

HARD LINES

Choosing a machine code tutor for your bookshelves isn't the easist of tasks unless you heed the advice of Chris Palmer

Bendid! a person evolving into the computer age Struggling along in the turgid quagmire of Basic until one day (cue *Thus Spake Zarathusa*) a huge monolith in the shape of machine code appears But how is the beginner to comprehend this evolutionary step? Simple head off to your nearest bookshop!

Which neatly (*Oh yeah! Ed*) brings us to four books kicking around the *Y64* office all of which profess to lead us to a more fulfilling life through machine code

Looking first to *Machine Language For The Absolute Beginner* by Danny Davis you might be interested to know that our Antipodean cousins from Melbourne House mean exactly what they say — it's for the absolute beginner! The book starts with some very simple explanations of the underlying concepts of machine code and by chapter eight you're already learning how to put up a Hi-res screen! A well-presented book that actually lives up to its title

The second entry from down under sails under athe title of *Supercharge Your Commodore 64* and it's penned by Barry Thomas Unfortunately this one doesn't live up to its title It professes to supply you with a set of ready-made machine code utilities to help you write more spectacular programs All you in fact get is a handful of simple sound graphics and sprite routines along with a couple of utilities Not very inspiring!

Our third contender hails from Shiva's 'friendly micro series' Written by Ian Stewart and Robin Jones *Commodore 64 Machine Code* provides a straightforward explanation of machine code principles based on the 64 but there's nothing too exciting Luckily it's saved from being an also-ran by the inclusion of some wonderful *Cosgrove* cartoons it's almost worth buying the book just to catch up on the adventures of this hapless group of bugs!

Finally we end up with a weighter tome in the form of CI Burkinshaw's *Beyond Basic On Your Commodore 64* from Sigma Press This one doesn't hang around — it's straight in there with hexadecimal and a diagram of the 6502 chip before you've even got your coat off! Out of all the books this is the one that believes that if you throw enough facts at someone they'll lodge in their brain eventually! Oddly enough despite its somewhat public school approach this was the only one to give you a game to type in at the end

Machine Language For The Absolute Beginner ISBN 0 86161 1454 £6 95 Supercharge Your Commodore 64 ISBN 0 8616 1748 £6 95 Commodore 64 Machine Code ISBN 0 906812 968 £6 95 Beyond Basic On Your Commodore 64 ISBN 0 905104 91 6 £6 95

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GOLD
IF YOU
YOU H

It's a range of top quality software from Commodore designed to make the most of your Commodore 64's capabilities

New packages will be introduced to the Gold Medallion range every so often, but only if they are really exceptional They'll definitely be hard soft to beat

Miss any of them and you really will be missing out

MUSIC MAKER

Whether you're an accomplished musician or an out-and-out beginner, Music Maker strikes exactly the right note

No matter if you've never played a note before, so long as you can hum and you know your ABC, you can start to play famous popular tunes immediately

MUSIC MAKER

And it won't be long before you appreciate Music Maker's many advanced capabilities you can synthesise many musical instruments, even create your own 'synth electronic sounds choose between monophonic or polyphonic play summon up pre-programmed rhythms and bass accompaniments, and more

Music Maker is the first in a series of packages which will fully exploit the Commodore 64's outstanding musical capabilities

On disk or cassette, with music keyboard, a clear and concise manual, and song book, for just £29 95

SPIRIT OF THE STONES

It's a treasure hunt for 41 real diamonds hidden somewhere on the Isle of Wight

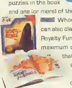
Only one man knows where they are and he's not saying

All that he has to say he's said already – but in the form of riddles, clues and puzzles

Solve the puzzles in the Spirit of the Stones program and you'll find it much easier to solve the puzzles in the Spirit of the Stones book

SPIRIT STONES

Solve the puzzles in the book and one (or more) of the diamonds can be yours



Whoever discovers a diamond can also claim his or her share of the Royalty Fund, which could grow to a maximum of £1 million It's a game that's as entertaining as it can be rewarding

On cassette or disk, £14 99

INTERNATIONAL FOOTBALL

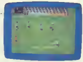
Already it's recognised as the best football game ever seen outside of Wembley

It's startlingly life-like, and gives you near perfect control of the players

You can kick the ball, dribble it, pass it,

FOR MORE INFORMATION CONTACT COMMODORE INFORMATION CENTRE 1 HUNTERS ROAD WELDON CORBY NORTHAMPTON NN17 1QX TEL CORBY (0536) 2052

MEDALLION.
HAVEN'T GOT IT
AVEN'T GOT IT.



head it or even throw it in from the touch-line And every time you belt the ball into the net the crowd cheer wildly

≡ How often you score depends on how good you are, and also at what level you choose to play

≡ There are 9 levels you can play against the computer Or you can play a friend

≡ International Football is a real test of skill dexterity and speed It is certain to drive you football crazy

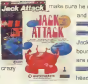
≡ On cartridge £14 99

JACK ATTACK

≡ There's no other game like it It has been voted by the U S magazine Electronic Games Hotline as a 'must buy

≡ Jack Attack is about squashing heads It's an addictive game, a game of strategy and cunning We can almost guarantee it will turn you into a head-case

≡ To stay alive Jack must leap aside from collapsing bridges and crashing blocks, and at the same time he must make sure he doesn t fail into the water and drown



≡ And that's the easy bit

≡ Because everywhere Jack goes he's dogged by jolly bouncing sadistic heads that are out to nut him

≡ He has to squash their heads before his is squashed

≡ And Jack can't afford to lose his head because we've only given him three and when they ve gone he's gone

≡ Jack Attack is available for both the Commodore 16 and Plus/4 On cartridge £14 99

commodore
HARD SOFT TO BEAT

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The price of Tandata Marketing s TM200 multi baud rate modem has been reduced from £217 to £173 (cheers!) but plus 15 per cent VAT

Tandata s other modem the TM100 remains at its usual price of £99 + VAT but communications freaks can find out more from Tandata Marketing on 01 940 6211

The TM200 — complete with autodial/autorecall

Cheapos In Space

In a moment of divine inspiration Mastertronic has just released a new cheapo game for the 64 entitled *1985*

The object of the game is to guide a spacecraft through a series of caverns in order to collect the nuclear plasma *1985* is available on cassette and costs just £1 99 Call Mastertronic on 01-402 3316 for further details

Who Struck Gold?

Thanks to all the readers who responded to our £2 000 US Gold competition (*Y64* issue 4) To remind you were asked to put in order of preference the nine qualities of making a game great we asked too for you to write your own additional feature

Actually we had a great response from you all and the overall winner of the 1541 disk drive and a complete supply of all the US Gold games produced to date (and for the rest of his life to boot!) turned out to be VN Cockayne of Stourbridge W Midlands He sent in the correct order of 1e 2h 3i 4c 5g 6f 7d 8b 9a — then wrote as his extra feature The facility to re-enter the game at pre designated stages thus avoiding repetitious preamble Well done Mr Cockayne!

The ten runners up were all close and each wins a complete range of US Gold games They are Irene Skolfield Feltham Middlesex David Brian South Harrow Middlesex S James Highton Liversedge West Yorks Jennifer Halligan Dagenham Essex Toby Hughes Reigate Surrey Giancarlo Bernini Wood Green London John Clarke Haxby York David Blake Hertford Herts N Doctor Stroud Glos and David Man Luton Bedfordshire

Finally the 50 near misses who each receives a US Gold game are K Nobbs Co Durham Mark Lennon Leicestershire Steven Blackett Co Durham Michael Smith St Ives HL London A Aston Stoke-on Trent H Hvidberg Denmark P Rillage Essex P Allwell Berkshire Michael Lloyd Tyne & Wear Philip Slater Devon Andrew Fowler Surrey Martin Ferns Wiltshire P Crisp Walsall John Worls Hertfordshire Gordon Hamlett London T Watson Cheshire Chris Raeburn Dalkeith W Chalmers Aberdeen I heather East Sussex T Vanderweele Hertford Phil Sherry Essex Richard Bush Kent Sam Man Glasgow Donald Macpherson West Linton Karl Stokes Oswestry A Hurds Glasgow Martin Wilson Sheffield Gobin Michel Belgium Francis Yu Bolton Richard Gray Dumbartonshire Neil Hall Co Durham G Wall Wolverhampton John Martin Crawley Andrew Carson Birmingham Mark Carmichael St Albans Craig Jones Dyfed David Kelham Bournemouth Shaun Dare Antrim John Manby Dundee Clare Vint Norfolk Luke Hindmarsh London I Shaw Kettering Bruno Kaiser Schweiz Peter Felming Guernsey M Dennison co Limerick CE Harland South Croydon Flemming Larsen Denmark John Tibald Richmond and Marcus Parry Dorset

Congratulations to all our winners

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REWRITE THE HIGH SCORE TABLES

So, you've got a Commodore You ve also got enemies With the Gunshot, you ll have all the opposition cowering in corners 8-directional action and an all-in-one moulded stem allows accurate annihilation and strength to survive those all-night sessions Dual fire buttons for fading fingers (and a rapid fire version when they're really coming thick and fast) And, if you break it (and we know you ll try) our 12-month guarantee will prove invaluable Only £8 95 The Gunshot plugs directly into the C8M 64 and Vic 20

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MISSIVES

Witty, intelligent and imaginative readers write to Missives. Your 64, 14 Rathbone Place London W1P 1DE So, let's be hearing from you!

Spectrum VS 64?

I am a Spectrum owner with access to a 64 and I was disgusted to read the various comments about Sir Clive s flagship in *Y64* issue 7

In your Open Access section under the headline 'Turn your 64 into a 35K Spectrum? I read that the Spectrum was spriteless had no Hi-res graphics and apperently can only BEEP! Of course the Spectrum can produce graphics to compare with the 64 it does have sprites and has been known to come up with the odd good tune (although even I must admit not a patch on the 64) Another point I d like to make quite clear is that the Spectrum offers 39K of RAM which is more than the 64 when it s making use of all its features!

As I m warming to my theme perhaps you d like to turn a few pages of the same issue and look at a letter from James Strang in your Missives section He was complaining about all the top machines and then proceeded to tell us that he wished people would stop complaining about machines other than their own A bit hypocritical don t you think? As for his remarks about the Spectrum! Adding a disk drive to the 64 costs more than the Spectrum alone And as for flipping out the ROM to reveal full RAM — even I know that this will leave the 64 useleast

I hope that you ll publish this letter as I m dying to see if Mr Strang will dare to respond

F O Farrell Bray Co Wicklow

I ll be interested to hear what Mr Strang has to say as well and anyone else who wants to throw in their half pennyworth For be it from me to criticise the ZX Spectrum — but I m not sure it s quite how you describe it! Ed

* * *

Nobody Does It Better?

All magazines have faults and in my humble opinion I m fed up with one of your advertisers

In mid-October I ordered and received a copy of *Caverns of Khafka* by US Gold from Miles Better Software Unfortunately the game wouldn t load so I returned it by first class post Now four months later I m still waiting for a reply!

I ve phoned on four separate occasions and been told that it was in the post But on my last phone call I managed to get someone to admit that it just might have been lost in the post

I know you re not Esther Rantzen but is there anything you can do to help It looks like such a good game

Michael Trotter Eastbourne Sussex

Do I look like Esther Rantzen? Anyway we gave Miles Better Software a buzz to check up on your order and it seems that the trouble was that your cassette interface was having problems coping with the new fast loaders Is anyone else out there having trouble with the Turbo-charged loaders? Let s be hearing from you Ed

* * *

For Cobal, Read Comal!

I m writing to try and help JL Mesterman from Middlesborough who wrote in Missives (*Y64* issue 6) He asks if there s a version of COBOL for the 64

Well to the best of my knowledge the nearest version of any language to COBOL (and one that s available for the 64) is COMAL (Common Algorithmic Language) This has many of the same commands that you ll find in COBOL but it also includes others that make use of the 64 s excellent sound and graphics capabilities

On a recent course to enable me to teach computer studies I was given a series of sample programs in several languages including COBOL The funny thing was that I was able to type the COBOL program straight into the 64 — with COMAL loaded in — virtually as it stood! Another point worth noting is that COMAL is an excellent language to teach others how to program — it s much much easier to demonstrate structured programming It s also the language that s taught in schools in Denmark Sweden Ireland and Scotland

Commodore will soon be launching a 64K cartridge containing COMAL for use on the 64 that'll give 60K of usable RAM! But if you can t wait until then — write to the ICPUG COMAL man Brain Grainger 73 Minehead Way Stevenage Herts and he ll transfer the language to a blank disk for you Of course you ll have to supply a blank disk and the return postage

Geoff Crowther Leicester

Cheers Geoff that s a real nice offer for any readers wanting to get hands on experience of COMAL before Commodore release its cartridge But do remember to send a blank disk and the return postage! Ed

* * *

Down in the Dumps

As a regular reader of *Your 64* I am writing to you for advice My problem is that I m unable to dump screen graphics of commercial games to my MPS 801 printer I ve had a few attempts at the code myself and I m beginning to get the impression it cannot be done

I ended up getting hold of the *Tony Hart Art Master* program but I m sorry to say that I can t even get a printer dump from the demo programs! And if that wasn t painful enough to admit the same thing applies to Talent s *Panorama H*

This may sound like a silly question but there isn t anyone out there who happens to know of a commercial program to accomplish this small feat? Of course if anyone s clever enough to have written a routine themselves

Arthur Soular Lanarkshire

There must be someone out there who can come to Arthur s aid Send your routine to Missives *Your 64* 14 Rathbone Place London W1P 1DE — and there s a special software surprise for the first one received that works You ll also get your program published in our fair magazine — so start tapping away tout suite! Ed

* * *

Stone Me!

I was interested to read your article about Gordon Ashbee and the Robot Workshop (*Y64* issue 5)

At the moment I m working for the Playbus Computer Project a group that takes computers to local youth clubs libraries playschemes and so on Anyway to cut a long story short we re using LOGO and obviously we re in the market for a turtle We also have a group who are interested in programming a robot — it s even been suggested that they build one from scratch!

So after reading said article I set out to find the Robot Workshop following the sketchy details in your article But after a two hour search of the area that could possibly be described as within "a stone s throw of Earl s Court (which isn t South London by the way!) I had to admit defeat I couldn t find the place and nobody I spoke to had heard of it

OK Ed Rowettt (if that really is your name!) — where was I going wrong? Perhaps there really is an Earl s Court in South London

Ian Miller Hammersmith & Fulham Playbus Association

Well Ian you must have been really close to the Robot Workshop It s actually at 121 Ifield Road London SW10 (Tel 01-373 8571) (Here at Y64, we regard anywhere South of Rathbone Place as being somewhere in South London!) Next time you go looking for somewhere in Earl s Court I d suggest you stop throwing stones and give us a bell on the Y64 Helpline (Tel 01 636 3513) Ed

* * *

Printer Problems

I wonder if you could help me with a query concerning the use of Commodore printers and printer/plotters

At the moment I m using a VIC 1525 graphic printer for things like listings and so on — but I m looking to getting hold of a printer/plotter eventually Now I know that the plotter is device 6 and my printer is switchable between device 4 or 5 printer and plotter Does it mean I have to unplug the 64 each time I want to use a different device?

Is there a splitter available that would enable me to connect both devices to the 64 at once? I can t be the only person with this problem can I?

PW Nicholson Plymouth

It certainly *is* possible to have both the printer and plotter connected to the 64 at once All you have to do is plug either of the devices into the back of the 64 and then plug the other into the one already connected Both printer and plotter have input and output sockets Ed

MISSIVES

Just Like That!

Here are some hints and tips for a few of my favourite games

Aztec challenge Level 2 Stick to the edges of the stairway and nip in and out of gaps when necessary Level 3 Stop just inside the door of each room but make sure you enter a small amount or you die you soon realise how far you need to move Then decide upon your tactics according to the nature of the room Level 4 The varmin if there is more than one animal in your path and they are very close together then keep jumping and you should get through Level 6 The piranhas wait just off the screen for a gap and when one appears charge! Dive a lot!

Motor Mania On the cross roads it is possible to pull off the screen to the right and disappear The only trouble with this method is getting back to refuel but to solve this POKE 6646 255 before you type SYS8000 This will give you infinite lives

Skramble (Anirog) 3rd sector fireballs go to the extreme left of the screen This gives you a much longer time to dodge the fireballs 5th sector maze pull your spacecraft as far to the right as possible and when you pull back to go up you have some leverage to allow you to do this Once you have pulled back push it forward again

Falcon Patrol Go to the top of the screen and let the aircraft past Then go after them and shoot them down

Aztec Tomb Many people do not seem to be able to cross the stream so here s how The capital letters are the words to use OPEN the DOOR using the key in the drawer in the bedroom and outside CLIMB BUILDING On the roof there is a piece of wood GET WOOD and climb down Go to the stream and DROP WOOD The wood will form a bridge CROSS the BRIDGE and you re over

Does anyone know how to get the jar to water the plant? If so could they write to me via this magazine

Revenge of the Mutant Camels There is a cheat mode on this! Type GOATS and the message cheat mode operative should appear To leave a stage hit the space bar

Here are some tips for those of you who don t like cheating

Silly Silicon Stand roughly in the middle and most of them will miss you If one should approach then duck

Sidney and the Portalavs Forget Sidney! Just hit the portalavs and you can get 70 000+ This kiosk is a nuclear free zone There are two approaches to this (1) My method — go to the far right of the screen and keep firing off screen — this will keep the telephones off and you will find that the CND signs tend not to fall on you (2) Jeff Minter's method — build up the phone boxes on the screen and you will find less CND signs fall (eight sprites on the screen!)

International soccer Shooting Either go right up to the goalie and if he dives hold it and put it in the net after he s dived (on the lower levels go past him and score) Run diagonally across the goal area and then turn and shoot If you are on target you nearly always score as the goalie does a straight jump

Goal kicks Go to the edge of the screen and as the ball is kicked start to run You should if you timed it well be running with the ball somewhere above you giving you a good chance of getting it

The Hobbit To escape from the Goblin s dungeon command Thorin or Gandalf to carry me then command to open window and finally to go through window You will probably find these work best as three separate commands

To escape from the wine cellar in the Elvenking s palace kill the butler with the sword empty the barrel or drink its contents (not advisable as you become drunk!) tie a rope to it carry it (if you have Thorin tell him to get in it) and throw it through the trapdoor and jump

Toby Hughes
Reigate Surrey RH2 7QT

Well that let s get to be worth a bunch of software — watch out for the Postman Toby! If anyone else has fought their way through to the far reaches of a game write to us and tell us all about it. And if you re into tricks 'n tactics check out Screenplay in Open Access this issue Ed

The answer to your pro

That's one answer, here's a more practical one – BREDEN'S BASIC

Much as we all love the Commodore 64 for playing games or running our business software on when it comes down to the nitty gritty of learning more about the computer and doing some programming there is much room for improvement

That is why we created **BREDENS BASIC** – it may not be the only extended basic around but after reading the following information we are sure it is the only one you ll buy

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YOU TOP TWENTY

THIS MONTH	LAST MONTH		
1	10	**GHOSTBUSTERS** ACTIVISION	INSTEAD OF GOALS WE'VE GOT GHOULS IN THE TOP SPOT! "GAME OF THE YEAR" — GIANCARLO BERNINI
2	1	**INTERNATIONAL FOOTBALL** COMMODORE	KICKED OUT FROM THE TOP OF THE SOFTWARE LEAGUE — THE SEASON'S NEARLY OVER!
3	3	**DALEY THOMPSON'S DECATHLON** OCEAN	BRONZE AGAIN! CAN DALEY KEEP HIS POSITION NOW THAT SUMMER GAMES ARE APPROACHING?
4	7	**JET SET WILLY** SOFTWARE PROJE	WILLY LOOKS SET TO JET INTO THE TOP THREE WITH YOUR HELP OF COURSE!
5	2	**BEACH HEAD** ACCESS	IT LOOKS LIKE THIS WAR'S GOING TO BE A WASHOUT — BEACH HEAD'S SURRENDERED ALREADY!
6	NEW	**SUMMER GAMES** QUICKSILVA/EPYX	SUMMER GAMES SETS A Y64 OLYMPIC RECORD FOR THE HIGHEST NEW ENTRY!
7	NEW	**IMPOSSIBLE MISSION** CBS/EPYX	THEY SAY THIS ONE'S IMPOSSIBLE HAVE YOU CRACKED IT YET?
8	8	**THE HOBBIT** MELBOURNE H	C'MON YOU LOT — WHO'S GOT THE HOBBIT HABIT? SEND YOUR VOTES NOW!
9	9	**HUNCHBACK** OCEAN	WE HAD A HUNCH THIS ONE WOULD STILL BE HANGING AROUND IN THE CHARTS
10	13	**FOOTBALL MANAGER** ADDICTIVE GAMES	THIS GAME ALWAYS MANAGES TO BOUNCE BACK EVERY NOW AND THEN" — NEIL LAMBE
11	NEW	**RAID OVER MOSCOW** US GOLD	AN OBVIOUS TITLE FOR A COMMIE 64 GAME AND A FAVOURITE AT THE WHITE HOUSE
12	6	**TALES OF THE ARABIAN NIGHTS** INTERCEPTOR	A BIG DROP FOR THE ARABIAN NIGHTS — WHAT HAPPENED DON'T YOU LIKE THEM ANYMORE?
13	RE-ENTRY	**ZAXXON** US GOLD	A GAME THAT'LL PLAY HAVOC WITH YOUR NERVES! GOOD TO SEE IT BACK
14	NEW	**THE STAFF OF KARNATH** ULTIMATE	A NEW ENTRY THIS MONTH — CHECK OUT THE Y64 MEGA-REVIEW THIS ISSUE!
15	RE-ENTRY	**VALHALLA** LEGEND	THE VIKINGS ARE BACK WITH A VENGEANCE! WE WARNED YOU THIS COULD BE A LEGEND!
16	5	**REVENGE OF THE MUTANT CAMELS** LLAMASOFT	AN AWESOME GAME FROM MINTER YOU'D BETTER VOTE FOR IT — CAMELS ALWAYS GET THEIR REVENGE!
17	14	**FORBIDDEN F** AUDIOGEN	LEAVES THE REST IN THE SHADE" — MARCUS HAUSEN SO WHAT'S IT DOING AT NO 17 MARCUS?
18	NEW	**ALIEN** MIND GAMES	ALIEN'S POPPED INTO THE CHART FROM NOWHERE AAARGH MY STOMACH!!
19	NEW	**MATCH POINT** PSION	PSION SCORES AN ACE OUT OF SEASON WITH THIS WIMBLEDON SIMULATION
20	NEW	**TAPPPER** US GOLD	A GAME THAT'LL SOON BUILD UP YOUR THIRST! CHEERS!

WHO DARES WINS!

How do you rate yourself as a games player? If you reckon you're pretty good, tell us your high scores — and we'll see if we can make you into Y64 games consultant! Read on

Here at *Y64* we'd like to thank you for all the support you've given us in the compilation of our unbiased Choice 20 chart. But don't think for a second that we're going to stop it — rather, the idea's going to be taken further! Take a look at the 'new improved' coupon on this page and you'll begin to get an idea of what we want you to do.

First off, though, don't get worried if all you want to do is vote for your favourite five packages and nothing else. That's easy — just fill in the left-hand side of the coupon with the same details you would normally; this data will be used to create our chart as usual. However, now look at the right-hand side of the coupon — the exciting bit!

THE CHALLENGE

All we're asking you to do here is tell us your highest score for each of your five favourite games. All scores *must* be verified by a witness (who will need to sign the coupon before you send it to us) and accompanied by a small photograph of *you* — a black and white passport photo would be best! Of course, once we've got your photo, there's no need to send another!

Then, once all your scores have come in, we'll be telling you what the highest scores are for each of the games in the chart — alongside the face of the top five games players who've managed to wrack up the high scores. It would, of course, be very easy to 'fix' the chart by lying about your scores — but it won't help you! If you give a ludicrous score, it'll be checked... and if you achieve one of the two highest scores, you run the risk of being invited down to the *Y64* offices to prove it. And we're not calling the *Y64* Chart Challenge 'Who Dares Wins!' for nothing — we're looking for the best games players around — and it could be you!

THE WINNERS!

Those chosen to battle it out on the joysticks in the *Y64* offices will be pitted against each other on the game they claim to be so good at. We'll be talking to the players as regards their tactics, and consoling the loser with a bunch of software to walk away with. The winner, on the other hand, is elevated to the position of an official *Y64* games consultant — we'll be looking to this growing body of crack games players to 'second opinion' our major games reviews in future issues!

Obviously, some games are easier to work out a high score than others. Amassing a few thousand points in a 'shoot 'em up' game is far simpler to tell us about than your highest score in *Staff Of Karnath*: using the latter example, we'd be looking for a time before midnight (computer time, that is!) that you managed to finish the game. But don't panic! We're getting everyone who's involved with *Y64* at the joysticks next month to give you some scores to aim for!

your 64 CHART CHALLENGE

Comp[illegible] th[illegible] coupon and send it to Chart Challenge, Your 64, 14 Rathbone Place, London W1P 1DE (Making sure you include a B&W photo if you're going for the high scores!)

My top five games are:

1
2
3
4
5

My top scores are:

1
2
3
4
5

Independent witness.

Name
Address

Postcode
Occupation
Signature

And this is who I am ...

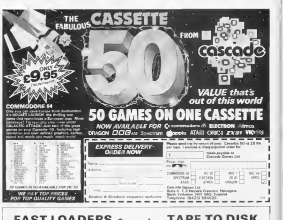
Name
Address

Postcode
Phone number

Signature

Stick your photograph here if you are going for the High Scores Chart

MAGAZINE HEALTH WARNING Using scissors on this page may impair the overall health of the magazine — please use a photocopy instead!



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MUSICAL MATTERS

Avid readers of the Commodore 64 manual may have noticed its similarity to various telephone directories and bus timetables — you know it's crammed full of all the information you want, but is it really designed for human consumption? So, tossing the manual to one side Keith Bowden *sets out to explain how to use the SID chip Take it away, maestro .*

If you didn t know already the 64 has the most sophisticated sound generating chip of any home computer Making use of just 29 bytes of RAM (registers ? the SIF (Sound Interface Device) chip controls its synthesiser facilities providing accurate frequency control of up to three voices simultaneously

Not only that but the SID chip provides four waveforms with pulse width modulation, programmable filters, synchronisation and ring modulation facilities What more could you ask for? Indeed these are all items you would normally expect to find on-board a digital synthesiser costing a good deal more than the 64!

The SID Chip

The SID chip registers may be split into five groups as shown in the SID Chip Registers table The first three groups of seven bytes control the frequency pulse width mode and envelope shape for each of the three available voices The fourth and fifth blocks consist of four bytes each Of the fourth the first two registers control filter frequency the third filter mode and resonance and the fourth volume and filter shape All the above registers are *write only* that is they must be POKEd to control the synthesiser but PEEKing these addresses generates meaningless results Thus any current register values needed at a later date must either be saved as variables or stored elsewhere in memory The last four bytes are *read only* The first two read the values of paddle potentiometers connected to the control ports and the last two give the current values of oscillator 3 (OSC3) and its envelope shape (ENV3) These can be used to dynamically control the three voices

The SID Chip: Details of Voice 1 Registers

Register		
0	Frequency low byte	16 Bits
1	Frequency high byte	
2	Pulse width low byte	12 Bits
3	Pulse width high nibble	
4	Control Register (CR)	
	Bit 7 Noise on	
	6 Pulse on	
	5 Sawtooth on	
	4 Triangle on	
	3 Test bit (if noise locks)	
	2 Ring modulator on	Synchronised to Voice 3
	1 Synchronisation on	
	0 Envelope trigger	
5	Bits 4-7 Attack	
	Bits 0-3 Decay	
6	Bits 4-7 Sustain	
	Bits 0-3 Release	

Details of Filter Controls

21	Filter frequency low byte	11 Bits
22	Filter frequency high nibble	
23	Bits 4-7 Resonance	
	3 External	
	0-2 Filter Voices 1-3	
24	Bits 7 Voice 3 off	
	6 High pass filter on	
	5 Band pass filter on	
	4 Low pass filter on	
	0-3 Volume	

N B The groups of registers for the three voices are identical except that where Voice 1 is synchronised with Voice 3 Voice 2 is synched to Voice 1 and Voice 3 to Voice 2

Notes and Frequency

To play a note on say Voice 1 the frequency registers must first be set If the required frequency is FOUT then the following piece of BASIC will scale FOUT to the units required by SID split it into its low and high bytes and then POKE them into the appropriate registers

```
FN=FOUT/0.06097
FHI=FN/256
FLO=FN AND 255
SID=54272
POKE SID, FLO
POKE SID+1, FHI
```

If the required note is to be specified by its musical name then the following code will give the required value of FOUT

```
FOUT=2↑(4+OCT+N/12)
```

SYNCHRONICITY

```
10 REM SYNCHRONISATION
20 A=5:D=10:S=15:R=12
30 OCT=5:N=0
40 L=2000
50 CR=16+2:REM TRIANGLE WAVEFORM,SYNCHRO
NISATION ON
80 SID=54272:FORI=0TO24:POKESID+I,0:NEXT
90 POKE SID+15, 5:REM VOICE 3 FREQUENCY
100 POKE SID+4,CR
110 FOUT=2↑(4+OCT+N/12)
120 F=FOUT/0.06097
130 FHI=F/256
140 FLO=F AND 255
150 POKE SID+24,15:REM VOLUME
160 POKE SID,FLO
170 POKE SID+1,FHI
180 POKE SID+5,A*16+D
190 POKE SID+6,S*16+R
200 POKE SID+4,CR OR 1:REM START
210 FORI=1 TO L:NEXT
220 POKE SID+4,CR:REM RELEASE
```

Our example program here produces a buzzing sound rather like a rasberry ! You could try and make some different noises if you play around with the values in lines 40 and 210

PULSE WAVE

```
10 REM PULSE SWEEP
20 A=5:D=5:S=15:R=15
30 OCT 5:N=0
40 L=255
50 CR=64:REM PULSE WAVEFORM
90 SID=54272:FORI=0TO24:POKESID+I,0:NEXT
95 POKE SID+24,15:REM VOLUME
100 POKE SID+4,CR
110 FOUT=2↑(4+OCT+N/12)
120 F=FOUT/0.06097
130 FHI=F/256
140 FLO=F AND 255
150 POKE SID+3,0:REM SET PULSE WIDTH TO
0
160 POKE SID,FLO
170 POKE SID+1,FHI
180 POKE SID+5,A*16+D
190 POKE SID+6,S*16+R
200 POKE SID+4,CR OR 1:REM START
210 FORI=1 TO L STEP 0.2:POKE SID+2,I:NE
XT:REM SWEEP PULSE WIDTH UP
220 POKE SID+4,CR:REM RELEASE
230 FORI=L TO 1 STEP-0.2:POKE SID+2,I:NE
XT:REM SWEEP PULSE WIDTH DOWN
```

This program produces a long flat note that eventually fades into the distance Like the waa waa program if you increase the value of L in line 40 the longer the note will be sustained the lower the figure you introduce to line 40 the shorter the length of the note

MUSICAL MATTERS

Where OCT is the octave number (0-7) and N is the note number (0-11) according to the following table

0	C	6	F#
1	C#	7	G
2	D	8	G#
3	D#	9	A
4	E	10	A#
5	F	11	B

This assumes that Middle C is at 256 Hz (cycles per second) The formula is based on the relationship between consecutive octaves (2 1) and consecutive semitones (2↑(1/12) 1) Thus the frequency of the C above Middle C is 512 Hz and there are twelve semitones in an octave The key of C (the white notes on a piano) consists of the sequence of notes

... C D E F G A B C . . .

These are the notes that are harmonious to the ear when played together with the base note C Two notes sound in harmony if the ratios of their frequencies can be written as the ratio of two simple integers but you will note that the ratios of the notes in our sequence all contain twelfth roots of two! Nevertheless in each case a very close approximation to a harmonious ratio can be found For example

```
G/C = 2↑(7/12)
    = 1 4983
    ≈ 3/2
```

This is called a fifth interval

Envelope Shape

The next step in playing a note is to set the envelope shape of the waveform This has as much effect on the sound of a note as its frequency and together with the timbre or overtone structure of the note governs the instrument with which we associate a particular sound SID gives the user control over attack and decay rates sustain levels and the release rate as in the diagram below

The solid line represents the time for which, say, a piano key was depressed and the dashed line the output volume Initially the piano string vibrates rapidly with a sudden burst of energy which almost as quickly dies down to a steady level until the piano key is released and the note slowly fades out The rise time of the note is given by its Attack rate A the fall time by the Decay rate D the volume by the Sustain level S and the time it takes to die out by the Release time R The appropriate values must be POKEd into the high and low bytes of registers 5 and 6 of the SID chip The following expressions show the process.

```
POKE SID + 5,A*16 + D
POKE SID + 6,S*16 + R
```

Each of the parameters A D S and R is in the range 0-15 By setting the attack rate high (slow) and the rest of the parameters low we could achieve the effect of a piano note played backwards such is the flexibility of the envelope commands

Timbre

The timbre overtone structure or frequency spectrum of a note is its other major property The way this is synthesised on the 64 is simple but effective Three waveforms are available (other than noise) The triangular waveform contains only the odd harmonics (multiples) of the fundamental frequency of a note and these are inserted in inverse proportion to the square of the harmonics in direct proportion to the reciprocal of the harmonic number The pulse or square wave contains all the harmonics of the fundamental frequency their proportion depending on the mark-space ratio (pulse width) By mixing these waveforms and then filtering the combination almost any overtone structure you desire can be achieved

For Voice 1 the fundamental structure of the note is defined by setting bits 4-7 in register 4 Bits 1 and 2 control synchronisation and ring modulation Voices 1 2 or 3 are filtered by setting bits 0 1 or 2 respectively of register 23 Bits 4-7 hold a number from 0 to 15 which governs the resonance of the filter Bits 4 5 and 6 of register 24 switch on lowpass bandpass and highpass filtering respectively in any combination The resonance governs the bandwidth of the bandpass filter (amount of medium frequency sound transmitted 0 giving the least and 15 the most) and the rolloff of the other two filters Bits 0-3 hold a number between 0 and 15 governing the overall volume of the synthesiser The filter frequency is an eleven bit number held in register 21 and 22 Finally if the pulse waveform is set the pulse width can be set to any number between 0 and 4096 with the low nibble in register 2 and the high byte in register 3

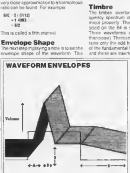
Playing a note

To actually play a note it is essential to do three things Firstly switch the gate of the control register off For Voice 1 this is done with

```
POKE SID+4 PEEK(SID+4) AND 254
```

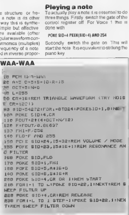
Secondly switch the gate on This will start the note It is equivalent to striking the piano key

WAVEFORM ENVELOPES



Using the SID chip, you're given complete control over the attack rate (A), decay rate (D), the volume of the sustain (S), and the release time (R) Users can organise the sound output by POKEing the high and low bytes of registers at 5 and 6 of the SID chip with appropriate values of these parameters In the above diagram, the solid line represents the time that a piano key was held down in relation to the output volume

WAA-WAA



```
10 REM WAA-WAA
20 A=5 D=5:S=10:R=15
30 OCT=5:N=0
40 L=255
50 CR=16:REM TRIANGLE WAVEFORM (TRY NOIS
E CR=129)
90 SID=54272:FORI=0TO24:POKESID+I,0:NEXT
100 POKE SID+4,CR
110 FOUT=2↑(4+OCT+N/12)
120 F=FOUT/0.06097
130 FHI=F/256
140 FLO=F AND 255
150 POKE SID+24,15+32:REM VOLUME / MODE
155 POKE SID+23,15*16+1:REM RESONANCE AN
D FILTER
160 POKE SID,FLO
170 POKE SID+1,FHI
180 POKE SID+5,A*16+D
190 POKE SID+6,S*16+R
200 POKE SID+4,CR OR 1:REM START
210 FORI=1 TO L:POKE SID+22,I:NEXT:REM S
WEEP FILTER UP
220 POKE SID+4,CR:REM RELEASE
230 FORI=L TO 1 STEP-1:POKE SID+22,I:NEX
T:REM SWEEP FILTER DOWN
```

Utilising a triangular waveform this program produces a nice waa waa effect Try altering the value in L in line 40 to change the noise output

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NOTE WE HAVE MOVED TO NEW PREMISES

MUSICAL MATTERS

```
POKE SID+4 (PEEK (SID+4) AND 254) OR 1
```

This will start the attack/decay/sustain cycle of the note. Finally switch the gate off again to start the release cycle (release the piano key).

Ring modulation

This effect can be used to create percussion sounds, bell tones, chimes and similar effects. It is a technique well known to electric guitarists and made famous by the late Jimi Hendrix. Ring modulation is a non-harmonic effect. It takes two input signals and outputs the sum and difference frequencies of the input frequencies. Notes that sound good together are related by ratios of simple integers (for example, the relationship between the frequencies of the notes C and G, a fifth, is 3/2). Two consecutive octaves have the frequency ratio 2/1. Music essentially works on a logarithmic scale (to the base 2): the note C in consecutive octaves having frequencies 128, 256, 512 Hz (cycles per second) and so on. Ring modulation, however, is a linear effect. If the two input frequencies are 200 Hz and 300 Hz the output frequencies are 100 Hz and 500 Hz (the difference and sum frequencies). If one input signal is held at a fixed frequency and the other one is stepped up the normal scale, the output signal (provided it is in the audible range of 20 Hz to 20 kHz) will consist of two signals, one stepping up a non-harmonic scale, and the other stepping down! The scale is non-harmonic because the difference in frequency of two semitones in the musical scale is related to the position of the two notes in the scale. The ratio of two consecutive semitones is always given by

$2\uparrow(7/12) = 1.4983 = 3/2$

It is this superposition of a linear effect upon a logarithmic scale that gives rise to the non-harmonic effects mentioned above. Note that ring modulation only works with the triangle waveform set on the SID chip.

Dynamic effects

During the period in which the note is actually playing, any of the parameters can be changed. Thus, rapidly varying the volume of the note gives a tremelo effect, and rapidly varying the frequency up and down gives vibrato. (Note that the 'tremolo' arm of a guitar actually produces vibrato.) A slow change in frequency gives glissando. Changing the central frequency of the bandpass filter up and down the frequency spectrum produces the wahwah effect well known to electric guitarists. Varying the width of the pulse waveform gives a form of the famous 'phasing' effect which was originally produced by playing two identical tape recordings slightly out of phase. Varying the pulse width rapidly gives a remarkable non-harmonic effect. Lastly, synchronising Voice 1 to the fundamental frequency of Voice 3, or setting ring modulation (and triangle waveform) and sweeping the frequency of Voice 3 slowly up and down produces a respectable imitation of the currently fashionable 'flanger' (which is actually a swept comb filter). Remember to switch Voice 3 off (unset bit 7 of register 24) when using synchronisation or ring modulation. Synchronisation bases the fundamental waveform of Voice 1 on Voice 3, effectively ANDing the two waveforms together. Many of these effects can be used simultaneously.

The simplest way to achieve dynamic effects is to increment a counter and POKE its value into, say, the filter frequency register, with the bandpass filter set, while the note is playing. This would produce the wahwah effect mentioned above. A more efficient method, particularly in machine code, is to use the oscillator and envelope values of Voice 3 (OSC3 and ENV3) available from the last two registers in the SID chip. All that is necessary is to PEEK the appropriate register (27 or 28) and POKE the result (or some value based on that result) into the appropriate register (volume, frequency, etc.) while the note is playing. Thus to obtain wah-wah we use

```
POKE SID + 22, PEEK SID + 28
```

Which uses the envelope shape of Voice 3 to sweep the filter frequency up and down the frequency spectrum.

Noise

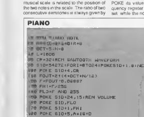
Noise can *not* be mixed with any of the other waveforms for any particular voice using the SID chip. If this is tried the noise waveform will lock out until the test bit for that particular voice is set. White noise consists of all frequencies in the spectrum at once. Filtering produces pink noise. Dynamically sweeping the filter frequency produces a dramatic rushing effect. Rapid attack and decay gives a cymbal-type sound which can be used in a rhythm backing.

The Finale

As you've probably gathered by now, the art of noise is not an easy one to master, but it is a satisfying one! If you haven't already, do type in the example programs given here — yes, they're short and sweet, but if you've read this far you'll understand much more of the theory that went into their programming. (They're also a lot of fun!)

This article was taken from **The Companion to the Commodore 64** by Keith Bowden published by PAN Books Ltd as part of the PAN/PCN Computer Library at £5.95

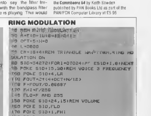
PIANO



```
10 REM PIANO NOTE
20 A=0:D=9:S=0:R=0
30 OCT=5:N=0
40 L=1600
50 CR=32:REM SAWTOOTH WAVEFORM
60 SID=54272:FORI=0TO24:POKESID+I,0:NEXT
100 POKE SID+4,CR
110 FOUT=2↑(4+OCT+N/12)
120 F=FOUT/0.06097
130 FHI=F/256
140 FLO=F AND 255
150 POKE SID+24,15:REM VOLUME
160 POKE SID,FLO
170 POKE SID+1,FHI
180 POKE SID+5,A*16+D
190 POKE SID+6,S*16+R
200 POKE SID+4,CR+1:REM START
210 FORI=1 TO L:NEXT
220 POKE SID+4,CR:REM RELEASE
```

This listing provides you with a low frequency piano note, complete with a saw tooth waveform. You can adjust the length of the note by changing line 210: try FOR I=950 TO L: NEXT, and you'll find the note's shortened to the point that it sounds like a guitar note!

RING MODULATION



```
10 REM RING MODULATION
20 A=0:D=10:S=10:R=12
30 OCT=5:N=0
40 L=2000
50 CR=16+4:REM TRIANGLE WAVEFORM,RING MO
DULATION ON
60 SID=54272:FORI=0TO24:POKESID+I,0:NEXT
90 POKE SID+15,30:REM VOICE 3 FREQUENCY
100 POKE SID+4,CR
110 FOUT=2↑(4+OCT+N/12)
120 F=FOUT/0.06097
130 FHI=F/256
140 FLO=F AND 255
150 POKE SID+24,15:REM VOLUME
160 POKE SID,FLO
170 POKE SID+1,FHI
180 POKE SID+5,A*16+D
190 POKE SID+6,S*16+R
200 POKE SID+4,CR OR 1:REM START
210 FORI=1 TO L:NEXT
220 POKE SID+4,CR:REM RELEASE
```

This produces a sound similar to the alarm clock you throw across the room every morning! Just like the Piano program, you can alter line 210 to change the length of the note — but you can also vary the value of L in line 40 to get some stunning effects: try the following lines: 40 L=15000 and 210 FOR I=7500 TO L: NEXT

Y64 & COMMODORE

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Judging the competition, we'll have a top-notch VIP from Commodore UK, one of the original programmers of *Music Maker* from Music Sales Ltd, and, of course, the *Y64* Editor. Inspiration may take a while to take root and flower — especially if you're prone to the *prima donna* tantrums we've come to expect from modern musicians — so, you've got two months to get your act together. OK, it's get your vibes together time and go for it ...

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MAKIN' MUSIC

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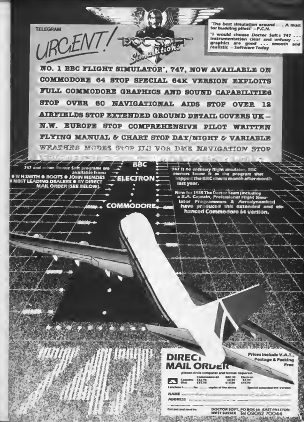
And On That Note!

If you haven't scored yourself a copy of Commodore's *Music Maker* yet (and you'll certainly need to lay your hands on the package to enter this competition!), it's available from all good computer stores and it'll set you back £29.95. For a comprehensive review of *Music Maker*, check out *Y64* issue 6. Any queries regarding *Music Maker's* availability should be directed to Commodore on (0536) 205555.



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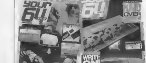

ISSUE 6

- Commodore's Music Maker
- Ghostbusters the game
- We put Commodore's Plus/4 and C16 on the bench

ISSUE 7

- Megagame — Raid Over Moscow
- Wordprocessors — Six of the best!
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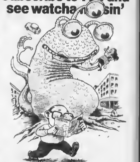

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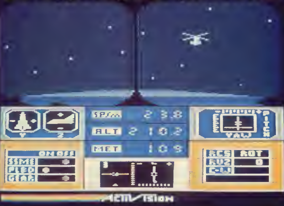
You'd better get the hang of this. One day you might be up here for real.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SCRAMBLE!

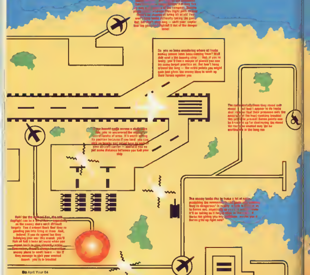
Despite its name, this is not a game for bunglers! As Craig Rawstron and Sue Denham find to their cost, Raid on Bungling Bay isn't just another 'shoot 'em up' affair, but a study of tactics

The first time out with *Raid On Bungling Bay* you may think you're up to your eyes in yet another shoot em up classic! But if that's the way you're going to approach the game long-term, you may as well forget it! Shooting planes and boats and bombing the odd factory might relieve a few frustrations you've got lurking around in your subconscious but if you want to make your 'wings' you'll have to resort to tactics.

Chocks Away

Bungling Bay was a quiet little backwater on a planet somewhere in a remote galaxy until it was overrun by an empire of evil tyrants. Their aim? To destroy humankind as usual! To do this, they're constructing the ultimate war-machine, run by computers and robots, and defended by an almost impenetrable network of enemy guns, radar and ships.

The defences are, of course, almost



Watch out for the gun targets/emplacements — they [illegible] bring h[illegible]. If you want to launch [illegible] all of the directions they [illegible] that they fire in many [illegible] of the compass. Enemy planes [illegible] redress their flight path so that there's no chance of being hit at all! You won't have [illegible] difficulty taking the guns out but don't stay long — shift your copter the top [illegible] right out of the danger zone!

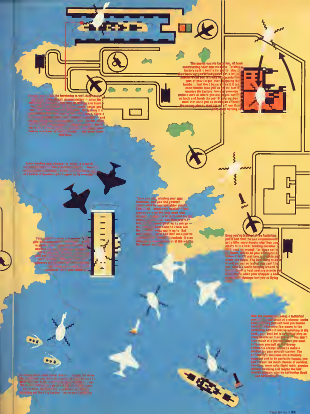
So you've been wondering where all those enemy planes have been coming from? Well this one's the [illegible] strip [illegible] that. If you're lucky you'll find a couple of planes you can try some target practice on. But don't hang around too long — the extra points you might gain just gives the enemy time to catch up their forces against you

The radar installations they [illegible] round and round [illegible] but don't appear to do [illegible] else [illegible] that their presence aids the accuracy of the [illegible]-looking [illegible] yet [illegible] be proved! Bonus points can be knocked up for destroying the [illegible] the [illegible] wasted may [illegible] be worthwhile in the long run

[illegible] across a [illegible] you've uncovered the [illegible] stocks of arms. It's worth noting its position because if you land you can pick up bombs and refuel here as well as your aircraft carrier — useful if you've put some distance between you and your ship

The enemy tanks like to make a lot of noise publicising their movements [illegible] they're dangerous! In reality a tank is [illegible] to [illegible] out, especially [illegible] it'll be taking on [illegible] these are giving you any [illegible] maybe you'd [illegible] give up right now!

Hah! the [illegible]! Yes, the odd dogfight can be a [illegible] especially as the enemy start each different targets. You'd almost think that they're goading you into firing at them. And, indeed, if you do spend too long [illegible] your war-like [illegible] you'll find all hell's been let loose when you [illegible] back to your aircraft carrier. Remember, there'll always be another enemy plane to [illegible] — but if they manage to sink your aircraft carrier you're in trouble!



The enemy has six factories, all busy constructing their war-machine. To blow a factory up it's best to fly over it [illegible] then back up, you'll find you've got a lot [illegible] control when you're flying backwards! [illegible] sure of your target, start dropping the bombs [illegible] but don't be surprised if it takes more bombs than you've got to bomb a bombsy big factory [illegible] remember to make a note of where you are so you can come back and finish the job! Of course, bear in mind that once you've destroyed a factory the enemy planes start taking off and things really start hotting up.

Although you'll find the battleship is well-defended, it's [illegible] flying from its landing platform — once the [illegible] and they're trouble [illegible] cause you [illegible] By the way it's [illegible] there's [illegible] and [illegible] your back.

Before landing your chopper it's worth [illegible] black [illegible] there [illegible] as a horde of bombers just happens to fly overhead.

There you are, minding your own business, and you find yourself [illegible] by enemy fighter planes. First of all, target your bombs — just concentrate on blasting away with [illegible] planes [illegible] but then you're [illegible] speed blasting as you go — the [illegible] seem to climb from the [illegible] what you're up to. But [illegible] you'll find that once you've [illegible] controls it's an [illegible] part of the world the enemy are [illegible]

Your aircraft-carrier is [illegible] girls with [illegible] is good [illegible] the [illegible] chopper is in your zone.

Once you've trashed three factories you'll find that the gun emplacements get a little more deadly with their new ability to fire heat seeking missiles. A [illegible] seeking missile [illegible] dodge all your attempts to dodge it as it'll just turn in a circle and come for you again. The best thing to do is to just get out as fast as you can! The only [illegible] it's worth hanging around to try [illegible] a heat seeking missile [illegible] when your chopper's had some damage but you're flying [illegible]

With the enemy [illegible] being a factoried [illegible] at a choppa [illegible] yourself but you bombs have [illegible] more fire-power to the battleship than it was [illegible] in dry dock, your best bet is to [illegible] as many bombs on it as you can. You won't have much of a journey when you want to re-arm yourself as the enemy battleship always seems to make a [illegible] for your aircraft-carrier. The battleship's defences are extremely powerful and to be perfectly honest you don't stand too much chance of survival. However, some nifty flight work, precise [illegible] bombing and maybe the odd [illegible] the battleship itself and hit harbour.

The enemy boats seem rather docile — except for when [illegible] your aircraft carrier [illegible] the enemy battleship.

SCRAMBLE!

impenetrable because, as you might have guessed, it's your thankless task to halt the war-machine in its tracks.

When you first start, you're presented with a plan view of Bungling Bay — a number of islands scattered liberally in the ocean. You control a helicopter on an aircraft carrier and, once you've taken off, you're able to fire missiles and drop bombs. you're granted a limitless supply of missiles, but only nine bombs . . . so use them sparingly.

All Mapped-Out

When you begin the game, it's worth sacrificing a few lives to fly around building up a mental map of your surroundings; an on-screen arrow will always indicate the position of your aircraft-carrier should you need to re-fuel or pick up more bombs.

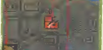
The first thing you'll notice is that there are quite a few guns sited on the islands that, guided by the radar installations, try and shoot you out of the sky. Avoiding these, you'll notice large buildings that are obviously the factories manufacturing the elements required for the war-machine: there are six factories in all, and you'll need to bomb each of them to destruction — this often takes more bombs than you have on-board, so don't expect too much from one raid.

Of course, once you've destroyed a factory, the game itself takes on a new aspect — you'll be dogged by a number of white fighter planes, and your aircraft-carrier will be menaced by various black bomber planes. Nasty!

But that's not all . . . destroy three factories and those mild-mannered gun emplacements start shooting off heat-seeking missiles at you! And if you thought your presence in Bungling Bay had so far gone undetected by the evil tyrants, you'd be wrong! While you're cruising around picking off factories and dodging enemy flak, they've been busy building a battleship ready to launch against your aircraft-carrier. You'd be well advised to check this out on your travels and blow it up before it's set against your meagre defences!

Tricks 'N' Tactics

By now, you've probably got the impression that there's no way to beat the game! Well, you're nearly right — it's not easy, but there's a few tricks and tactics we've given you that'll actually help you on your way.



There's a mini map of the immediate area surrounding your chopper — the detail's not too clear and you'll probably have to check what's happening on the larger map anyway!

This could be you bombing an enemy factory?

This here's your overall score — don't worry, it'll get better once you've destroyed this factory!

This arrow always points in the direction of your aircraft carrier; useful if you're running out of fuel or you've just heard your ship's under attack.

Once your damage registers more than 99 you're dead!

This figure tells you that you have a full quotient of nine bombs on board!

The number of factories you've got to destroy.

How many lives you've got left!

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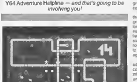
ROUTINE ADVENTURES

Calling all avid adventure gamers, read this page without delay! Why? Well, not only will adventure expert Jack Oats *be taking a good look at* Euraka *and* Return To Eden, *but there's the inception of the* Y64 Adventure Helpline *— and that's going to be involving you!*



Domark's Eureka gives you five adventure games in one — and if you manage to crack the first four and find the hidden message in the fifth, you're in with a chance of winning the £25,000 prize!

EUREKA
DOMARK/£14 95

Cassette
one player
timings, arcade 2½ mins
advent 6½ mins

It seems as though home computer software is taking over where Fleet Street left off! Take *Eureka* for example — this was launched with all sorts of hype and a promise of £25 000 to the first person phoning through with the game's hidden message! Hmm

Getting back to the game itself *Eureka* is actually split into five different adventure components each preceded by a rather uninspiring arcade screen Playing this arcade game is mandatory — which will not please the *true* adventurers out there indeed the points gained here determine your fighting strength during the adventures It has yet to be proved just how vital it is to get these vigour points — and if you do need thousands of points to get through the £25 000 's pretty safe! It's not that they're difficult to beat — just very boring!

The aim of the game is to find parts of a Temporal Talisman which inadvertantly got transported through time and space when it was under analysis in the NASA space labs! The five adventures take place in Pre-Historic Roman Arthurian World War II and Modern Times you many only enter the fifth part having solved the preceding four The graphics are of a chunky nature and very effective except that you're not able to turn them off! The occasional bursts of music are also very good but those can be turned off

The instruction booklet that comes with *Eureka* contains additional riddles in the form of verse pictures and even the odd hidden code in the decorative borders(!) The instructions you're given are thin on the ground but adequate The game's vocabulary is not all that extensive and responses can be often very misleading be careful to ensure that you've tried obvious synonyms before giving up on your intended course of action!

It's best to cut your teeth on the WWII episode This offers a greater chance of staying alive long enough to gain some experience of how the game functions The program doesn't support a 'SAVE character' routine so if you die you'll have to go through the whole thing again very tedious!

Eureka may not be of the best adventures that you'll ever come across (and the arcade interludes are ghastly!) but at under £3 each they're certainly good value and just think about that £25 000!

RETURN TO EDEN
LEVEL 9/£9 95

Cassette
one player
load time 2½ mins

So Level 9 has eventually succumbed to producing its first graphic adventure! And the company has done well — it's amazing what you can cram into the CBM 64's memory when you really try!

Although this is the follow-up to *Snowball* it's not necessary to have completed (or even played! *Snowball* to enjoy

Y64 ADVENTURE HELPLINE

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Have you ever ended up stuck in a room full of locked doors only to find that the key was under the mat all the time? Annoying isn't it!

Well here at *Your 64* we're looking to set up a write-in service for readers who've sorted out the solution to a particular problem in a game We'd also like to hear from anyone who wants help with various stages of an adventure!

You'd be surprised how many letters we get from readers who've invested a tenner in an adventure only to find they can't even make it out of the first location! Well the first step is to phone up the manufacturer — companies are usually happy to help you out of any mess you get into

However if the publishers give you no joy then that's the time to look to your fellow *Your 64* readers to give you a hand Simply fill in the coupon on the left of this page and send it off to the address given This way once we've published your particular hassle if another reader's already sorted out this problem he or she will be able to ring you up and put you out of your misery Who knows you could make a friend for life!

Of course if you've cracked a particular adventure you could offer to help any other readers solve their problems Simply fill in the coupon below giving a time that's convenient for people to ring you and that's all there is to it! If you're feeling shy though why not write and tell us your hints 'n' tips for an adventure and if it's published we'll send you one of the latest adventure packages on the 64!

Enthusiastic adventurers should write to the *Y64 Adventure Helpline Your 64* 14 Rathbone Place London W1P 1DE Join me for some compulsive reading next month!

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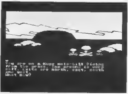
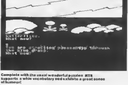


You are on a huge mole-hill rising
from the grass. The ground is very
soft. Exits are north, east, south
and west.
What now?

Return To Eden is not only the follow-up to Level 9's Snowball, but it's also the company's first foray into graphic adventures.



butterflies.
What now?

You are [illegible] pleasantly through
the blue grass.
What now?

Complete with the usual wonderful puzzles RTE supports a wide vocabulary and exhibits a great sense of humour!

Return to Eden Each scene has its own picture which is drawn quite rapidly to the screen If you're retracing your steps and you haven't time to check out the scenery you can of course turn off the graphics And just to show that Level 9 understands the frustrations of adventurers it's included routines allowing you to save a character's status and position to tape or disk Level 9 — we thank you!

You get to play the games hero Kim Kimberley And just to prove your heroism you've just saved a giant spaceship full of colonists travelling to Eridam A from certain disaster Unfortunately in risking your neck for these ungrateful people you've left them with the impression that you're opposed to their mission and a murderer to boot!

You could of course escape to space but Snowball will get you (and that's another story!) This time you escape in a lifeboat and nip down to the surface of the planet which has been prepared by robots for colonisation Your only hope is to contact the robots and explain your problem But as you might have guessed the last thing these mechanical menaces want to do is relinquish their power to a mere human! You soon find out the robots have already alienated the local animal and vegetable kingdom — it's only a matter of time before they get you!

As with many adventures nowadays this one's split into a number of seperate scenarios — the next only attainable once you've solved the last! And *Return to Eden* is full of those wonderful puzzles that once solved make you want to kick yourself for not having seen the solution earlier! The game supports a large vocabulary and the programmer's fine sense of humour is more than evident Thoroughly enjoyable and highly recommended!

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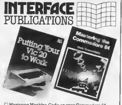

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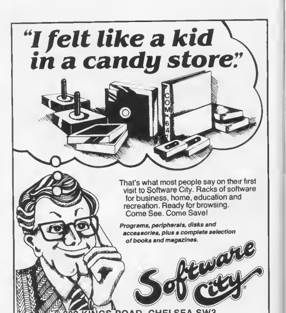
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It's unusual to find a game that combines the very best in arcade action together with the mind-numbing problems you'd find in adventure scenarios. But, as Ross Holman *and* Steve Broadhurst *find out,* Staff of Karnath *is just such a game! But then, what else would you expect from a company with a name like Ultimate!*

SPELL BOUND

Fitting firmly into the arcade/adventure category, *Staff Of Karnath* is Ultimate's first venture into the 64 software market. It's also the first game not to have appeared already on the Spectrum.

THE STORY SO FAR ...

The plot is a trifle complex — but then what game doesn't have an involved storyline these days? Apparently, there was once a powerful wizard, Karn, who managed to hide a magic staff with awesome powers deep within the bowels of his castle. You're told the staff's hidden in an obelisk ... but you can only open it with a magic key; the key comes in the shape of a Pentangle — a five pointed star to you! And to make life just that little bit difficult, it's split into 16 different pieces that are all hidden around the castle.

The hero of the piece, and perhaps set to become the 64's Sabre Man (à la *Sabre Wulf* and *Underwurlde* on the Spectrum), is Sir Arthur Pendragon. The date is April 30th — Wulpurgis Night to all you would-be devil worshippers — and the time is 6pm. At midnight, all Hell (literally!) will break loose! But, if you're following the plot so far, the idea is that Sir Arthur must assemble all the pieces of the Pentangle and destroy the staff just in the nick of time! Unfortunately, many hideous creatures guard the pieces of the Pentangle and all are capable of drawing the life energy from our hero. Sir Arthur's only defence is to be nimble-footed, or to cast one of the ten magic spells at his disposal. However, the correct spell must be chosen for each particular creature or it'll do no good at all. And, as each spell you cast decreases Sir Arthur's life energy by one (and he starts with 100 points), you'll have to learn the effects of each spell quickly if you're to survive!

ON DISPLAY

The screen display is so good that it warrants some good old-fashioned enthusiasm. The player views the castle as if it were a doll's house, with the front of the house cut away; by judicious use of colour and shading, perspective is achieved in a very realistic fashion.

Using the joystick, you can move Sir Arthur left or right and, as it were, into or out of the screen; as he approaches the limits of the screen, the room scrolls smoothly with each further step to reveal more of the castle. The rooms are sometimes wider than one screen, sometimes smaller, and are separated by walls with doors — no surprises here. To open a door, Sir Arthur has only to walk up to the handle and — Open Sesame — it swings open; once Sir Arthur's passed through, the door slams shut. Open doorways are staircases leading up or down one floor while closed ones lead to the room behind. And if you want to be really impressed, take a look at the contents of the rooms — especially the flickering candles and flame effects in the fireplaces.

STAFF PROBLEMS

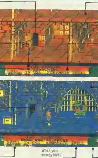
Tackling each piece of the Pentangle is a bit like playing 16 separate games — some pieces are won through the usual dodge and hack methods associated with the arcades, others are a matter of being au fait with adventure games; witness the routine you have to go through to eke out the Pentangle piece in The Waiting Room.

You'll also have to watch out when you attack the nasties. It's often worthwhile hanging around outside certain rooms, selecting the correct spell — rather than rush in blindly, hoping for a lucky break!

The game itself can get a little tedious — the journey back to the obelisk does get a little repetitious after a while! But, all in all, *Staff Of Karnath* is easily one of the most compulsive games I've ever played. Even knowing where all the pieces are and the spells you'll need to collect them won't help you very much if you are planning on completing the entire adventure ... believe me, I've tried!

Now turn over for Y64's complete map ...

DUNGEONS AND DRAWING ROOMS ...



This is a door going down — you can tell because it's coloured in solid black

This line tells you what room you're in

The word SEARCHING tells you that you've still to find a piece of the Pentangle

This doorway leads up to the next level; look closely and you can see the ascending steps

You start at 6pm and you've got to collect all the Pentangle pieces by Midnight ... or all Hell's let loose!

When your energy level reaches zero you're dead!

A nice feature is that you can sometimes look in on the levels above, giving you a sneak preview of what's going on

Here you've engaged the Forthrin spell which is your general all-purpose weapon in the Castle

You'll know when you're in the Dungeons because the walls have been decorated in mauve, as opposed to the brown brick of the higher levels

On either side of the screen there's an outline of the Pentangle; notice here that you've already found one of the pieces

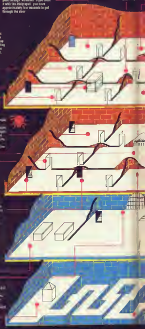
THE COMPLETE MAP OF CASTLE KARNATH

THE GOLEM
The [illegible]

THE NORTH TOWER UPPER
The doorway down to the North Tower Lower is protected by a force field which will kill you if you try to pass through. However if you blast it with the Sixty spell you have approximately four seconds to get through the door

THE TIMELESS ROOM
Time goes crazy [illegible]

THE TREASURY
Guarding the four treasure chests plus a piece of the Pentangle is a venom-spitting python. Liberal use of the Kosmos spell sends it reeling to the ceiling, whereupon you can [illegible] under the beast and grab it.



[illegible]

[illegible]

[illegible]

[illegible]

THE ARMOURY
[illegible]

[illegible]

[illegible]

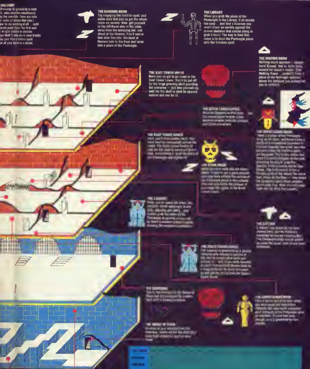
[illegible]

[illegible]

[illegible]

[illegible]

[illegible]



BALCONY
alcony is guarded by a mad k, who marches relentlessly g the corridor. There are also suits of armour that don't ear to do anything at all ... until walk past them! The first mad knight [illegible] ge that'll aid you in your tracks you fire a Fortees spell d of you to act as a shield.

THE MORNING ROOM
Try engaging the Ibrahim spell, and make sure that you've got the whole room on-screen. Now, get yourself to the left-hand side of the table, away from the annoying bat, and shoot at the flowers. You'll notice that after five hits the bowl of flowers falls to the floor and turns into a piece of the Pentangle.

THE LIBRARY
When you grab the piece of the Pentangle in the Library it all seems too easy ... and that's because you won't stand an earthly against the armed skeleton that comes along to grab it back! The way to beat this room is to blast the Pentangle piece with the Yerobas spell.

THE WAITING ROOM
Nothing much appears [illegible] here! Except, that is, flying [illegible] around for about [illegible] Waiting Room [illegible] piece of the Pentangle [illegible] above the [illegible] you to [illegible]

THE EAST TOWER UPPER
Here you've got to get down to the East Tower Lower. Don't be put off by the large grinning skull guarding the entrance — just line yourself up, wait for the skull to start its upward motion and run for it!

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

SIR ARTHUR'S MAGICAL ARMOURY
[illegible]

FORTHRIN	[illegible]
IBRAHIM	[illegible]
THROMIN	[illegible]
UMPHALUS	[illegible]
STOLY	[illegible]
YEROBAS	[illegible]
KNOSSUS	[illegible]
BARACATA	[illegible]
MENHIR	[illegible]
AEULUS	[illegible]

ACTION REPLAY

No. of players **Joystick** **Joystick optional** **Cassette** **Disk**

Joystick junkie Steve Malone *settles down to tackle the latest and greatest games software for the CBM 64 Won't you join him?*

Welcome to this month's *Action Replay* only to find me wading through the mass of cassettes that never quite made it to the review pages that follow

Amongst the also-rans was *Shoot The Rapids* from New Generation Software The idea here is to paddle your canoe through a load of gates while avoiding such obstacles as rocks motor boats and Beavers (!) — and all this against the clock. One uncharitable soul around the *Y64* offices suggested that the programmer should be shot but I wouldn't be so unkind

Audiogenic's *Alice In Videoland* has been available on disk for quite some time and now it's finally managed to drag itself on to cassette Based more or less on Carroll's *Alice In Wonderland* book there's much falling down rabbit holes drinking from magic bottles and playing of croquet It's both extremely pretty and rather gentle — don't expect a cardiac arrest from this one!

For quite a while now someone has been bombarding the *Y64* office with verbal graffiti on *Eddie Kidd's Jump Challenge* We've had posters stickers press releases — the lot! All that's left now is for Eddie Kidd himself to turn up on the doorstep! It's a shame the game itself isn't as entertaining as the promotion on yer bike Eddie!

Melbourne House's popular hero (it says here) Horace reappears in a game called *Hungry Horace* And yes yet another programmer bereft of good ideas has decided to dig up the rotting corpse of Pacman and feed him his energy pill for just

Steve Psycho Malone — Action Replay supremo!

one more shake To be fair *Hungry Horace* is trickier than yer average *Pacman* clone but does anyone care? (*Answers on a postcard please Ed*)

Gilsoft has released a series of adventures based around its *Quill* adventure writing utility These are *Africa Gardens* (set in a hotel) *Diamond Trail* (set in a city) *Spyplane* (set in enemy territories) *Magic Castle* (set in a wait for it castle) *Mindbender* (set in who knows where) and *Devil's Island* (set on an island)

We've had a whole hoard of mini-ancients emerging blinking into the cold light of day in the *Y64* office And it seems that Avalon Software is responsible for most of them! *Snap* and *Pontoon* are unpretentious little games for those too bone idle to shuffle a pack of cards and *Fruit Machine* is OK for others too lazy to pull a handle But for those whose bank balances wouldn't allow them through the door of a Monte Carlo casino there's *Roulette* from No Man's Land (a French company naturellement!) it seems a mildly amusing way of not losing thousands of pounds To be frank I didn't expect much from any of them so I wasn't very disappointed

Over now to the old games never die they just get re-written department *Titans* from Romik Software is a game set in ancient Greece that has you hanging for dear life on a flying horse trying to cope with all kinds of mythical monsters Funny, but I'd swear it looks just like *Defender* only with different sprites Still the action's fast and furious!

Finally a word or two about British Telecom's own (cheapo) Firebird Silver label *Mr Freeze* is only £2 50 — and at that price it's worth the money it's entertaining enough especially seeing Mr Freeze's delightful walk However if you're not a shareholder of the company and can afford a bit extra I'd suggest you look elsewhere

QUESTPROBE/SPIDERMAN

Adventure International/£9.95

○○○○○

Hi there true believers how about a little web-slinging? Yes it's time to tune in to the second adventure in a 12-part series starring the Marvel comic book characters we all know and love Part one concerned the death-defying antics of the Incredible Hulk and now it's the turn of Spiderman

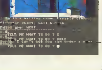
We're told there's a common theme running through all adventures — apart that is from the constant plugging of Marvel Comics (Stan Lee was never a man to undersell himself!) On a far and distant planet countless light years from Earth a bunch of philosophers are running into trouble They're being attacked by heavies calling themselves the Black Fleet and our merry meanies are hell-bent on success The problem is these philosophers are a peaceful crowd who've forgotten how to fight — all that is except one who is busily hoarding the powers of all the various super-heroes rather like some interstellar butterfly collector The object of the adventures is to somehow work out why

In the meantime however it's a question of wandering the offices of the Daily Bugle and encountering Spiderman's best known enemies — Spidey's greatest hits you might say (*Or not as the case may be! Ed*) Apparently everything hinges around a bio-gem a piece of which has somehow turned up on earth

This is the sort of adventure I like Good graphics friendly ish vocabulary and a subject I know something about Packed in with the adventure is a comic book which bears a passing resemblance to the on-screen action it doesn't actually give any hints but it does point you in the right direction All in all another game where the Yanks have shown us Brits how it should be done

The graphics are drawn very well and accomplish the task of making the game very similar to reading a Spiderman comic book

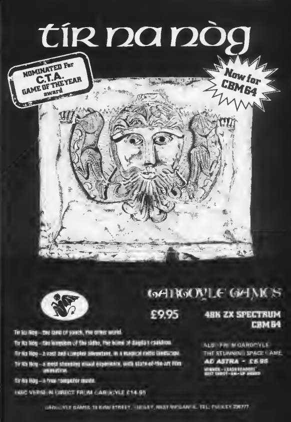
Like Gaul the screen is split into three! The top section contains the graphics the middle bit spews forth the information on what's happening and the bottom part of the screen is left clear for your commands



```
I am in a waiting room. Visible items
Elevator shaft. Call button.
Exits are: WEST
TELL ME WHAT TO DO ? E
TELL ME WHAT TO DO ? HELP
I can't but you can order a [illegible]
TELL ME WHAT TO DO ?
```

Pressing the call button for the elevator will do you no good at all!

This adventure allows you to make use of a very large vocabulary of commands — which means you don't spend the first half hour of play wondering how to pick up an object! Replies are generally helpful or smartass — there's a hints book available but only if you write to New York



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ACTION REPLAY

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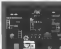
★★★★★



Following the birth of the latest royal sprog software houses who know a passing bandwagon when they see one have begun producing games based around the antics of Chas and Di (witness Microdeal's *Di's Baby*) *Henry's House* is an exceedingly pretty little game in which our royal hero ventures forth to explore the palace meeting all manner of strange things on the way

Henry's House is another of those endless platforms and ladders games that have you feverishly picking up any number of unlikely objects in room after room — while avoiding the ghastly things that go bump in the night

There are eight rooms to explore in *Henry's House* these range from the Clothes Cupboard to Henry's Creepy Dungeon As in most examples of this sort of game there's a right way to go about collecting things without running into trouble and there's a wrong way! The trick is of course to work out the right way!

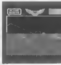
In this job it's easy to become jaded If I see just one more version of *Jet Set Willy* I'm going to have to reach for the Power Pills Except this just happens to be one of the best games of its type that I've seen for many a long day

Having starred in such an unexpected winner I daresay Lil Henry will now be given his own series A star is born!

STELLAR 7

US Gold/£9.95

★★★



Remember *Battlezone* the arcade game that has you battling with the spectral outlines of tanks and where you are forever advancing on mountains which never actually get any nearer? Well, *Stellar 7* is just like that — and what a coincidence I hear you say

The difference between this and *Battlezone* is that here you are fighting your way to Arcturus to intercept the evil Gir Draxon To get there you have to ensure the dispatch of the ten or so enemy tanks satellites planes and so on that get in your way Perm any two from three zoom above the correct score and hey presto, a bright and shining star like object will appear all together now Aaaah

So ram it! This simple action will hyperwarp you through to the next star system (it's easy to tell the sky looks different) where more outlines wait to do nasty business with you And so it goes on Crash your way through seven stellar systems (hence the name geddit) and you have reached Arcturus

Actually I find the trick with these sort of games is to aim ahead of whatever it is you're gunning for these boys move much faster than you can Assuming you have the knack you'll find *Stellar 7* fairly easy to play (at least at the lower levels) and it's a game that will bring tears of nostalgia to those who'm spent there youth in the seventies arcades

3D LUNATTACK

Hewson Consultants/£7.95

★★★★

Meanwhile back at the 3D shoot-em-up we have *3D Lunattack* from Hewson Consultants And — holy galaxies — it appears that a bunch of aliens known as the Seiddab (that's baddies backwards — geddit?) have invaded the moon as the commanber of a squadron of lunar fighters it's up to you to destroy their base and save civilisation (*Yawn do I have to today? Ed*)

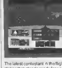
To aid the brave pilot in the fight against the alien menace there are any number of assorted weapons and controls at his or her disposal — missiles that blast and lasers that fry And you get a map that shows you're going and a navigation computer I must say I found it tough getting the hang of this one The aliens tend to come over the horizon and although you think you've got plenty of time to draw a bead on them the gunsight is actually awfully difficult to control (which might of course just be *my* problem) Another problem of mine is that I like to be told what I'm supposed to be looking for I spent the first thirty seconds shooting up moon craters before realising what they were! Flying the moon buggy is fairly easy although the aliens seem to have a lot more zip and once they appear it's pretty difficult to avoid them

For once the graphics actually live up to the blurb on the case and the moonscape is drawn in very good high resolution

SPACE SHUTTLE

Activision/£9.99

★★★★



The latest contestant in the flight simulator stakes that stands ready for your admiring glances is *Space Shuttle* from Activision

First of all don't be put off by the manual that takes you three hours to read (which usually means you need a Doctors degree to understand it) in fact the controls are fairly straightforward Your mission is to rescue a satellite that you probably put into the wrong orbit in the first place

With one eye on the appropriate chapter it's fairly easy to blast off (it's amusing to fantasise real NASA astronauts using one of these step-by step manuals!) But once in orbit you'll find that locating the satellite and docking with it is quite another matter To hit the correct speed and altitude simultaneously is something of a real feat — because of the trade off between the two And don't get too smug if you achieve it remember there's still the minor problem of landing the shuttle without ending up at the bottom of a multi-billion dollar hole

The graphics are done professionally although they're nothing to write home about! I particularly liked the way the Earth and sky changed colour as you moved in and out of the sunlight the sky also begins to get ominously dark when you begin to drift too far away from the planet

Space Shuttle is really quite addictive particularly when the chase is on to catch the elusive satellite I doubt however whether this is an accurate simulation

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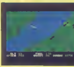
ACTION REPLAY

BLUE MAX

Synsoft/£9.95

★★★



In this month's simulation corner we have *Blue Max*, goggles and flying helmet number from Synsoft.

Originally written for the Atari, *Blue Max* is one of those *River Raid* sort of games where you take off, bomb some curious looking guns and buildings on the ground, shoot the occasional sprite — and then land again — I'm afraid there's not much exploration. A sort of circuit and bumps affair that sounds simple enough.

Well actually, no! For one thing, I might be old fashioned, but when I pull the joystick back I expect to go up — not crash into the ground (and, yes, I did have the joystick round the right way). It would have been nice if Synsoft had told me it'd moved the goalposts before I'd destroyed some 20 aircraft on take off. I mean, you feel such a fool!

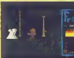
Anyway, once airborne you flit around the circuit causing mayhem for King and country. The buildings are easy enough to deal with, as are the tanks (or are they tanks?) but the moving trucks are more difficult, not to mention the enemy aircraft. It's rather a pity you can't engage the Laudits in dogfights (as we flying buffs call it) — all they do is fly off the screen — damn cowardly I'd call it.

The graphics and play of *Blue Max* are similar to what you'll find in *Zaxxon* — and to be frank I'd recommend you buy that instead.

FRED

Quicksilva/£7.95

★★★



Yet another product to roll off the seemingly endless Quicksilva production line — and this time it's a re-working of the Spectrum favourite. The question is — why has it taken so long to arrive for the 64? After seeing so many other programs of this type on the 64, one could be forgiven for thinking that *Fred* is a direct rip-off — apart from the fact that *Fred* came first!

Anyway, back to the game itself. As Fred the explorer, you pick your way through a load of catacombs by shinning up and down ropes, picking up treasure as you go. The catacombs are inhabited by ghosts, skeletons and mummys and, when you run into them, part of your energy ebbs away: guess what — run out of energy and you're dead! You are armed just with a gun which, though it has little effect on the ghosts (which drift through walls a la Pacman), is useful against the mummys and skeletons. However, as a nod towards realism your gun has only six shots in it, so it's advisable to go easy on the fire button. Mind you, providing you can keep control of the joystick, it's probably just as easy to outrun the nasties and dive out of the way — as they don't seem to chase you anyway!

Once you've collected all the Egyptian bric a brac that's lying around there's the small problem of getting out. You can do this by locating a grill in the maze and blowing it out with the handy bomb you're supposed to have found on your travels.

CAESAR'S TRAVELS

Mirrorsoft/£7.95

★★★★

Caesar has been caught smashing up the larder by his owner Mr McGregor and the nasty man decides that our feline hero is uneconomic, not to mention redundant. Caesar must now go forth and scratch a living from the big wide world.

The big cat never gets bored as he travels around. He gets chased by dogs and parrots, gets stuck in car boots and dustbins, meets unfriendly butchers, fishmongers, witches and much, much more. In fact, he's quite the little action cat!

Caesar is guided on his adventures by the Function and Return keys, each of which has a different command, such as 'Hide' or 'Jump'. And every so often he's asked an educational-type question like 'How many cats?' or 'Which is the biggest fish?'

The screen is divided up into two parts, the top telling the story of the trials of Caesar while the bottom is an animated graphics screen which acts out the action.

Some among you may be wondering why this game's being reviewed rather than some brainless 'shoot 'em up' — well *Caesar's Travels* has a quality which makes most 'grown-up' adventures look like the half-baked bilge they actually are! The story's interesting, the graphics are great and the sound isn't at all bad either.

Buy this one for a younger brother or sister and I'll bet you end up playing it yourself!

CHOPLIFTER

Ariolasoft/£9.95

★★★

If you want to see the 'biggie' from Ariolasoft, take a look at the Y64 review of *Raid On Bungling Bay*. But it seems the game was so successful that the company's wasted no time in releasing the follow-up.

In many ways, *Choplifter* is similar to *Raid*, especially as it seems that you're once again piloting a helicopter against the Bungelings in the name of the good ol' US of A. This time, however, the object is to rescue a group of hostages who have been kidnapped by the Bungeling Empire.

The 64 prisoners are being kept in what looks like miniature Swiss cottages and, when you land, they emerge, wave their arms about and gratefully climb aboard. Naturally, the Bungelings take offence at this and they lose no time in dispatching a bunch of tanks after you. The best way of dealing with them seemed to be to pattern bomb the whole area!

As with *Raid*, the first level is fairly easy while the second is getting on for impossible. Once you've delivered the first load of hostages (the chopper only takes 16 at a time), things really start to get out of hand. Suddenly, you're beset by jet aircraft and floating mines, and the pathetic little pea-shooter that passes for your weapon hardly seems adequate.

Although not as good as *Raid*, this game's alright, and the concept is as good a 'shoot 'em up' as you'll find anywhere.

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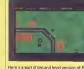
FRONT LINE

Interceptor Micro/£7 00



Here's a sort of ground level version of *Blue Max* that has you meandering around blasting away at anything that moves

The year is 1984 — although you wouldn't know it from all the jets and helicopters the enemy throws at you — and you're in control of an experimental battle tank that charges around the countryside doing battle with anything that raises its alien head

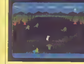
The map depicts your heroic actions is the usual kind of flat greenery and carefully winding rivers and roads so beloved of games programmers Things to avoid while you're rolling along are the mines the octopus-looking folk which you can't damage (but they can hurt you) and the fireballs which seem to have a magnetic attraction to your metal exterior Apart from that anything else is fair game

Easy you may say Ha! The trouble is the programmer has included an unusually mean feature You fire a shell by pressing the fire button but it won't actually explode until you let go again! You've not only got to aim the darn thing at a moving target you also have to judge when the shell has to explode That's not easy especially if like me you're used to just stabbing away at the fire button

Front Line is not the best game I've ever seen but it *is* engaging and a lot more fun than most of the other stuff around It's also pretty difficult to master

GANDALF THE SORCEROR

Tymac Software/£9 95



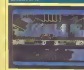
Those of you with undamaged braincells will remember that a couple of months ago a Tymac offering won the game of the month accolade (admittedly against poor opposition) mostly on the strength of the speech synthesiser Well my little chickens Tymac has done it again so let's see how it measures up to the last effort

Gandalf the Sorcerer is based around a *Necromancer* kind of design — and that after all is one of the classics The trick is of course to not copy too slavishly Well as Gandalf the Wizard your task is to destroy the lizardmen who are besieging your castle and you do this by firing bolts at them Once they're bumped off the lizards turn into gold coins which is really jolly decent of them The dastardly scaly things are attempting to steal your apprentices and I bet you're thinking the object is to try to stop that happening But wait if you don't allow them to break down the door, how are you going to collect those nice gold coins? Even a wizard has got to earn a crust you know The biggest problem is that when the door's broken down the first of the univited guests is a spider which has a nasty tendency to run into you and transform the wizard into a puddle of shapeless goo Nasty! Once you run out of spells it's up to the castle tower where Gandalf *is* refuelled by a convenient lightning bolt

Sorry chaps no award this time!

BLACK THUNDER

Quicksilva/£8 95



Quicksilva has not been without its bad press in this column of late For every good game that emerges from the portals out comes a handful of stinkers!

Black Thunder is one of the former and I'm delighted to report a rare gem indeed It's an arcade stunner that's fast frenetic and thoroughly addictive

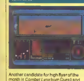
As Crow-Ther (the programmer's name in case you didn't know) the object of the exercise is to depart from the town of Wizening on the local motorway system — easy until you realise you're being pursued all the while by the android Highway Patrol

It's split screen action On top is your motor a sort of customised VW Beetle that you see speeding past a rather attractive landscape Don't however spend too much time admiring it if you want to stay alive for any length of time keep all eyes firmly on the screen at the bottom That's where you'll see a scrolling map of the motorway system complete with the helicopters and petrol cars that are coming to git ya! Flying things have a nasty tendency to drop bombs on you so do everything you can to avoid ending up underneath them Nifty footwork will get you behind and in position to open fire To get out of the city alive you have to score a maximum of 10 000 points this you'll get by offing your pursuers and picking up the little gold things

Phew! After a game like this I think I'm almost prepared to sit through anything!

COMBAT LYNX

Durell £9 95



Another candidate for high flyer of the month is *Combat Lynx* from Durell and here the action involves you guiding a helicopter towards the enemy tanks and hurling missiles at them

A curious game is this On the face of it *Combat Lynx* seems to have everything going for it 100 per cent machine code, the assistance of Westland Helicopters a wealth of controls to play with a map to wander through — and a choice of weapons! All in all good stuff which should add up to an absolute stormer and yet it doesn't quite make it.

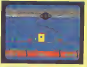
If we're talking about realistic flight stimulators (which I presume we are) then one would surely expect to see the view from the cockpit at all times — and here one doesn't The only time you're in the saddle is for the few seconds when the enemy tanks are in view and you're having to target on them most of the time you're looking at the helicopter itself The terrain has hills and towns — which certainly makes a change from the usual featureless snooker table Yet the scrolling is unaccountably jerky Meanwhile although missiles explode around you they're hardly worth bothering about because they almost always miss

Really *Combat Lynx* is not all that bad, I guess I was just expecting something a little better It seems a shame to waste such good ideas in a shoot 'em up game!

ACTION REPLAY

KAMI-KAZE
Supersoft/£5.95

✪✪✪✪✪



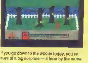
Believe it or not an alien battle cruiser with the fleet's secret plans has landed on Cleethorpes pier. But evidently it's a master of inter-planetary disguise for it induces hallucinations in humans and animals leading them to believe that it's actually a public loo and the secret plans are in fact toilet paper! As Commander of the battle fleet hovering over Cleethorpes your task is to stun the humans and dogs (who have clearly been watching too many Andrex adverts) before the plans go down the pan — sorry tube.

Obviously this is a deeply important game with the very future of the galaxy itself at stake. So clutching the joystick off we go to save Cleethorpes. The first thing that crosses your mind as you play is that perhaps the local beer weighs a bit heavy — there did seem to be an awful lot of people wanting to use the loo. The second thing you notice is the joystick only fires horizontally, vertically or at a 45 degree angle — so you have to keep moving the spacecraft to be able to fire in the right direction. Another problem is the clouds: if they hit you the spaceship blows up!

The graphics are very nicely designed, way better than the usual bog standard variety. In fact — sorry all Brit programmers — when I first saw the screen I thought it *had* to be an American import. Control is nippy and should keep the joystick jocks happy for hours.

PERILS OF BEAR GEORGE
Cheetahsoft/£6.95

✪✪



If you go down to the woods today, you're sure of a big surprise — a bear by the name of George who wanders around eating apples as they drop out of the trees. So what on earth is he doing? Well winter is coming on and Bear George has to hibernate — and you wouldn't want him to starve now would you? (I didn't hear that!)

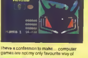
The game divides into two parts. In the first screen you have to guide George around an orchard while all about him apples are dropping faster than the value of the pound! Using your trusty joystick the trick is to position George underneath the falling fruit, pull the stick back, George opens his mouth — and bingo the apple drops inside. If your timing's off they bounce off his head but success allows George's fat content to visibly rise. Beware however the nutter squirrel!

After a while, just as boredom begins to set in, the scene changes to winter and now it's time to guide George to his cave for his winter snoozie-pooze. Our bear however clearly has an incredibly small brain because he's chosen a resting place that's directly underneath a ski-slope and busier than the M1! Your job is to stop silly George being dumped in the snow.

The press release that arrived with this game warns reviewers not to condemn it as too easy: things apparently get a lot harder as you go up through the levels. I didn't think it was easy ... I thought it was silly.

DAVID'S MIDNIGHT MAGIC
Anolasoft/£9.95

✪✪✪



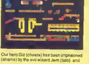
I have a confession to make ... computer games are not my only favourite way of passing the time. OK — so it shows. The thing is whenever I go into an arcade I always head straight for the pinball tables. Pinball is much more physical ... you can thump the thing and throw it around. Computer games just don't have that aspect and there's no way of releasing that pent-up energy.

So it was with some trepidation that I approached *David's Midnight Magic*, a computerised pinball simulation. I've played pinball simulators before and they've been uniformly awful — hence my suspicions. This one however turned out to be the best I've ever come across — which admittedly isn't saying much! The ball behaves much like a real pinball in that it doesn't exactly follow the paths dictated by Newtonian physics: it has a certain randomness built in. It also travels at more or less the right speed.

What's more, the programmers have even attempted to do something about being able to jolt the machine — in this case you bang away on the space bar. Do it too often and the game tilts. OK it's not ideal but a nice idea all the same. The flippers are friendly and responsive and with a bit of imagination I could almost believe I was playing a real pinball machine — almost. But ... why on earth is the game called *David's Midnight Magic*?

BIG BEN
Interceptor Micro/£7.00

✪✪✪



Our hero Giz (cheers) has been imprisoned (shame) by the evil wizard Jem (boo), and the only way he can escape is by ringing Big Ben's bell (eh?). But there's a problem (natch) because first Giz has to collect coins that are needed to open the tunnel to the bell.

If you think this sounds like a cue to a ladders and platform game you'd be right! And you won't be disappointed. Giz starts his endeavours at the bottom left-hand corner of the screen. A few steps away is a turbo plane with which he can make his escape. But don't be fooled into thinking that you can nip in and fly around picking up the gold pieces.

To start with, the plane doesn't fit into some of the tight holes where the coins are hidden and, for another, you can't pick up anything while locked away inside the cockpit anyway. That means Giz has to leg it all around the screen.

You'll find scattered around among the gold coins some interesting looking contraptions which at first sight look worthy of investigation. Avoid the temptation — unless you take sadistic delight at turning poor old Giz into pink blancmange!

The Big Ben screen scrolls sideways which makes a change from the usual umpteen-rooms platform game mode of operation. Overall it's pretty good — and rather more diverting than usual.

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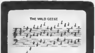

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Y64/SPECTRUM UK COMPO

SPOT THE DIFFERENCE

In conjunction with Spectrum UK Ltd, Your 64 is proud to present its very own Spot The Difference competition. And there's £1,000 worth of Commodore peripherals and software that must be won

This competition involves a skill we happen to know that *Y64* readers are very good at — and that's spotting mistakes in the magazine (*Hrmph! Ed.*). And very simply, all we want you to do is take a good look at the two specimen £500 vouchers shown here and see if you can spot the difference!

First off, though, here's a clue. The £500 voucher shown in the coupon is the one that's riddled with mistakes. All you have to do is to find them.

Then, when you think you've spotted all the deliberate mistakes, ring the differences on the £500 voucher inside the coupon and complete the rest of the form. Before you post it off to us, write down the number of differences you found between the £500 vouchers on the back of the envelope.

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Competitions wouldn't be as much fun if there weren't a few prizes flying around — and that's why there'll be a real £500 voucher for the first correct entry to be picked out of the Editor's hat. And not only that, Spectrum UK has also stumped up five £100 vouchers for the five runners-up.

Of course, it's no use stomping into any old shop demanding goods with one of these vouchers — you'll have to spend it on Commodore peripherals and software only in one of the many Spectrum UK chain stores throughout the UK. And seeing as how Spectrum UK carry virtually every CBM goodie that's around, you're in for a real treat!

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- Entries for the Spectrum UK competition must be post dated not later than 30th April 1985.
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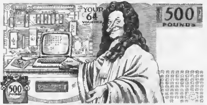
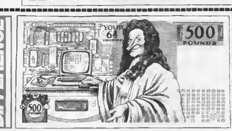


Y64/SPECTRUM UK COMPO SPOT THE DIFFERENCE



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Think about it before you cut this magazine to pieces — most people prefer to use a photocopy!

KEYBOARD KAPPERS

3D MAZE

Now another 3D maze program might not sound like the most earth-shattering event since sliced floppy disks but with a smattering of machine code this program from our regular Keyboard Kaperist has a lot more to offer than the rest!

MAIN PROGRAM VARIABLES

L(Array)	The location changes representing the four directions used in the random maze generation
DR$(Array)	Directions North East South and West
LN$(Array) LM$(Array) LF$(Array) CS$(Array) RF$(Array) RM$(Array) RN$(Array)	The string variables that form the seven elements of the 3D maze display The arrays here are for Left Near Left Middle Left Far Centre, Right Far Right Middle and Right Near
MC	Machine code
JV	Joystick value
L	The start location for the random maze generator (that is, the middle of the screen)
LV	The level of play (1-5)
P	The position in memory which equates to player's current location in maze (Players start at location 1905 on screen which is copied to memory location 50036)
DR	The direction indicator (1 4)
MO	The change in location resulting from one move by the player
TA	The number of minutes allowed for each game
NL	The next location — required by the random maze generator
LN LM LF C1 C2 C3 RF RM RN	The subscript variables for the corresponding string arrays, dependent on the contents of the maze locations

Basically you're stuck in the middle of a labyrinth and you suddenly realise that there's a time-lock fitted to the only exit! Before you start off you'll be able to see a plan view of the maze being drawn on-screen The exit is always at the top-right of the screen and you — a blue asterisk — start off in the bottom left-hand corner the maze in between as you may have already guessed is drawn randomly each time so there's no chance of you memorising the way out!

Once you've seen the maze plan for about ten seconds you're off! The screen splits into two with the left-hand side revealing the corridors of the maze on the right you'll see a digital clock counting out those precious seconds till the exit is sealed forever! Underneath the graphics screen you'll see a compass that you can use as a guide on your travels — but don't spend too long admiring it time is *not* on your side!

There are two pages of on screen instructions accompanying the game and once you've read those carefully you must select the level of difficulty you want Level one — the beginner's level — allows you five extra looks at the map and five minutes to escape the maze hardened escapologists might like to select level five — but be warned you've only one minute to get through the maze and only one extra look at the maze!

All movement on-screen is accomplished by joystick the joystick must be placed into Port 2 But before you rush off and type the program in there are a few things you ought to watch out for First up the triangular symbols in lines 1040-1190 are control codes for the colour cyan Also as the program's fit to bursting with machine code it's a wise move to save the program *before* you run it — a single typing error will more than likely produce a crash and you don't want to have to type it all in again do you?

The hieroglyphics in the following lines can be entered more easily if you press the CBM key and Shift (to get into lower case mode) and then enter the following text

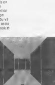
```
3050 3D MAZE INSTRUCTIONS PAGE 1
3260 3D MAZE INSTRUCTIONS PAGE 2
4060 3D MAZE LEVEL SELECTION
4150 LEVEL CHOSEN
4170 PUSH UP ON JOYSTICK TO
     CHANGE LEVEL
4180 AND PRESS FIRE BUTTON TO
     SELECT
```

Lastly the 3D maze strings in lines 9000 10540 are made up of Cursor Home Cursor Left Cursor Right Cursor Down Reverse On Reverse Off Shift £ Shift " CBM H and CBM N characters (the last two symbols are difficult to identify in the listing when they occur next to solid characters!)

And that's it! So what are you waiting for? Get lost in our amazing 3D maze game!!

The number of times you can look at the maze plan depends on the level you chose to start on here you're on level 4 so you've only got two extra chances to look at the maze

The amount of time you've got to complete your journey is dependent on the level you choose — take it from us level 4 is difficult



The compass at the bottom of the screen is always there to help you guide yourself round the maze It may seem unimportant but just wait until you've used up all your extra looks at the maze plan!

This box tells you how much time you've got left to get out of the maze — and with 25 seconds left don't hang around!

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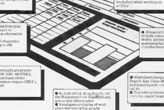

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```
1000 REM*********************************
1010 REM TITLE SCREEN
1020 REM*********************************
1030 PRINT"▟"CHR$(142)CHR$(8):POKE53280,
0:POKE53281,0
1040 PRINTTAB(11)"██◣◤█      ████◣◤█
 ◥"
1050 PRINTTAB(11)"◣      █ █████◣ █ ◣
 █ "
1060 PRINTTAB(15)"◣ █ █████◣ █ ██◣ █ "
1070 PRINTTAB(12)"█◤█     █◤█   ◣ █ ██
◣ █ "
1080 PRINTTAB(12)"◣     █ ◣   ◤██ █ ██
◣ █ "
1090 PRINTTAB(15)"◣ █ █████◣ █ ██◣ █ "
1100 PRINTTAB(11)"█◤█    ◤██████◣ █
 ◤"
1110 PRINTTAB(11)"◣     ◤███████▌     █
◤"
1120 PRINTTAB(8)"██◣◤██──────────────
───────┐"
1130 PRINTTAB(8)"▙█ ██ █ ▼▼ ◤▼ ▼▼
█    █ |"
1140 PRINTTAB(8)"▙█ ██ █ █▼ ◤▼█ ◤▼◤▼
▼▼◤▼█ ███ |"
1150 PRINTTAB(8)"▙█ ██ █ █ █ █ ██ ██◤▼
◤██    ██ |"
1160 PRINTTAB(8)"▙█ ██ █ █ █ █    ◤▼◤▼
███ ████ |"
1170 PRINTTAB(8)"▙█ ██ █ ██ █ ██ █
█    █ |"
1180 PRINTTAB(8)"▙█ ██──────────────
──────┘"
1190 PRINTTAB(8)"▙█
  ◤"
1200 PRINTTAB(12)"███BY R.BLUNT 1984"
1210 FORJ=1TO5000:NEXT
```

Lines 1000-1210 Print the title screen

```
2000 REM*********************************
2010 REM SET UP MACH.CODE & CONSTANTS
2020 REM*********************************
2030 L(0)=2:L(1)=-90:L(2)=-2:L(3)=90
2040 DR$(1)="N":DR$(2)="E":DR$(3)="S":DR
$(4)="W"
2050 FORJ=828TO878:README:POKEJ,ME:NEXT
2060 FORJ=880TO956:README:POKEJ,ME:NEXT
2070 GOSUB6000
```

Lines 2000-2020 Assign variable names to the constants, read and POKE the machine code data into the cassette buffer

```
3000 REM*********************************
3010 REM INSTRUCTIONS
3020 PEM*********************************
3030 PRINT"▟"CHR$(14);
3040 PRINT"████┌──────────────────
───────┐"
3050 PRINT"████|3─ \♥♥─ ╮/♥|_┤╮┌/♥ ┐♥|
─┌/─|"
3060 PRINT"████└──────────────────
───────┘"
3070 PRINT"█ *** ┐└─♥♥─ ┐└╱| ┤┌♥|╮~ ╮
┬┘ 2 ***"
3080 PRINT"█WHILE EXPLORING A LABYRINTH
OF PASSAGES"
3090 PRINT"YOU LEARN THAT THERE IS A TIM
E LOCK ON"
3100 PRINT"THE ONLY EXIT."
3110 PRINT"█USING YOUR COMPASS AND A MAP
 OF THE"
3120 PRINT"PASSAGES, YOU MUST ESCAPE FRO
M THE MAZE"
3130 PRINT"BEFORE IT IS PERMANENTLY SEAL
ED."
3140 PRINT"█UNFORTUNATELY IF YOU CONSULT
 THE MAP TOO";
3150 PRINT"MANY TIMES IT WILL BE LOST!!
THIS CAN"
3160 PRINT"MAKE THINGS DIFFICULT."
3170 PRINT"█INITIALLY YOU OBSERVE THE MA
P BEING"
3180 PRINT"DRAWN. WHEN IT IS READY YOUR
POSITION IS";
3190 PRINT"SHOWN BY A BLUE STAR IN THE B
OTTOM LEFT"
3200 PRINT"CORNER. YOU THEN HAVE 10 SECO
NDS TO PLAN";
3210 PRINT"YOUR ROUTE TO THE EXIT, TOP R
IGHT."
3220 PRINT"██ *** ┐└─♥♥ ─╮_─ |┤|┌/ ┤┌─
┐♥|─ |┌┌ ***";
3230 JV=PEEK(56320):IF(JVAND16)<>0THEN32
30
3240 PRINT"▟";
3250 PRINT"████┌──────────────────
───────┐"
3260 PRINT"████|3─ \♥♥─ ╮/♥|_┤╮┌/♥ ┐♥|
─ |┌┌|"
3270 PRINT"████└──────────────────
───────┘"
3280 PRINT"██YOUR NEXT VIEW IS FROM WITH
IN THE MAZE
3290 PRINT"█YOUR COMPASS INDICATES THE D
IRECTION YOU";
3300 PRINT"ARE FACING AND EACH MOVEMENT
IS SHOWN BY";
3310 PRINT"A FLASH OF THE POINTER ARROW.
"
3320 PRINT"█IN THE RIGHT HAND PANEL, THE
 TIME TAKEN"
3330 PRINT"AND THE TIME ALLOWED ARE DISP
LAYED WITH"
3340 PRINT"THE NUMBER OF MAP REFERENCES
REMAINING"
3350 PRINT"AVAILABLE TO YOU."
3360 PRINTTAB(12)"██┤┌ ♥|╮~ ┤┌/|_┌L"
3370 PRINTTAB(14)"██MOVE FORWARD"
3380 PRINTTAB(19)"█↑█"
3390 PRINTTAB(8)"TURN LEFT █─┼─█ TURN RI
GHT"
3400 PRINTTAB(7)"█╮█─_─█ BUTTON TO VIEW
 MAP.)"
3410 PRINT"████ *** ┐└─♥♥ ─╮_─ |┤|┌/ |┌
┤┌/|╮/┌─ ***"
3420 JV=PEEK(56320):IF(JVAND16)=0THEN342
0
3430 JV=PEEK(56320):IF(JVAND16)<>0THEN34
30
```

Lines 3000-3430 Display two pages of instructions on screen, and wait for the fire button to be pressed after each page. (Note that your joystick must be plugged into Port 2.)

```
4000 REM*********************************
4010 REM SET VARIABLES & SELECT LEVEL
4020 REM*********************************
4030 L=1524:LV=1:P=50036:DR=1:MO=-40
4040 PRINT"█"CHR$(14);:POKE53280,0:POKE5
3281,0
4050 PRINT"███████┌────────────────────
──┘"
4060 PRINT"███████|3─ \◆◆─ └─╳─┘ ♥└─┤
┌/|"
4070 PRINT"███████└────────────────────
──┘"
4080 PRINT"██─IVE LEVELS OF PLAY ARE AVA
ILABLE THUS:"
4090 PRINT"█████└─╳─┘ 1█ - 5 MINUTES &
5 MAP REFS "
4100 PRINT"█████└─╳─┘ 2█ - 4 MINUTES & 4
 MAP REFS
4110 PRINT"█████└─╳─┘ 3█ - 3 MINUTES & 3
 MAP REFS."
4120 PRINT"█████└─╱─┘ 4█   2 MINUTES & 2
 MAP REFS
4130 PRINT"█████└─╳─┘ 5█   1 MINUTES & 1
 MAP REFS "
4140 PRINTTAB(26)"█┌─┐"
4150 PRINTTAB(13)"└─╳─┘ ─|┌♥─/ |█|█|"
4160 PRINTTAB(26)"└─┘"
4170 PRINT"█████|◆| ┐┌/ ┤─|█╮─ |┌ ─|
●/|─ └─╳─┘"
4180 PRINT"█████◆/─ ─┘─♥♥ ─╮─ |◢|┌/|┌
♥└─┤ ";
4190 JV=PEEK(56320):IF(JVAND16)=0THEN418
0
4200 JV=PEEK(56320):IF(JVAND1)=0THENLV=L
V+1:IFLV>5THENLV=1
4210 PRINT"██████████████████████"TAB(27)RI
GHT$(STR$(LV),1)
4220 IF(JVAND16)<>0THEN4200
4230 PR=6-LV:TA=6-LV:TA$="000"+RIGHT$(ST
R$(TA),1)+"00"
```

Lines 4000-4230 Initialise the variables, display the levels of play available and wait for player to select level using the joystick

```
5000 REM*********************************
5010 REM RANDOM MAZE GENERATOR
5020 REM*********************************
5030 PRINT"██"CHR$(142):POKE53281,15
5040 FORJ=1TO3:PRINT"██
                    ":NEXT
5050 FORJ=1TO10:PRINT"██
                    ":NEXT
5060 PRINT"███   ██████████┌──────────┐"
5070 PRINT"█████ ██████████|MAZE PLAN|
"
5080 PRINT"██████████████████└──────────┘█"
5090 POKEL+54272,15:POKEL,4
5100 J=INT(RND(1)*4):K=J
5110 NL=L+L(J)
5120 IFPEEK(NL)=160THENPOKENL+54272,15:P
OKENL,J:POKEL+L(J)/2,32:L=NL:GOTO5100
5130 J=J+1:IFJ>3THENJ=0
5140 IFJ<>KTHEN5110
5150 J=PEEK(L):POKEL,32:IFJ<4THENL=L-L(J
):GOTO5100
5160 POKE1143,160:POKE55415,15:POKE1985,
42:POKE56180,0:POKE2,192:SYS828
```

```
5170 FORJ=1TO10000:NEXT
```

Lines 5000-5170 Generate a random maze in the form of a plan view identify the player as a blue asterisk and wait approximately 10 seconds for you to study it

```
6000 REM*********************************
6010 REM DISPLAY 3D MAZE
6020 REM*********************************
6030 PRINT"█";:FORJ=1TO24:PRINTTAB(23)"
 ":NEXT
6040 PRINTTAB(23)"█     █"
6050 PRINTTAB(27)"████████████████":PRINT
TAB(27)"███              ██"
6060 PRINTTAB(27)"███  3D MAZE   ██":PRIN
TTAB(27)"███             ██"
6070 PRINTTAB(27)"████████████████":PRINTT
AB(27)"██          "
6080 PRINTTAB(28)"██            ◥"
6090 PRINTTAB(28)"█  LEVEL"LV"█   "
6100 PRINTTAB(28)"█  "TA"█ MIN    "
6110 PRINTTAB(28)"█  ALLOWED  "
6120 PRINTTAB(28)"◥█          ██"
6130 PRINTTAB(28)"███           ◥"
6140 PRINTTAB(28)"█ REMAINING "
6150 PRINTTAB(28)"█ PLAN REFS "
6160 PRINTTAB(28)"█          "
6170 PRINTTAB(28)"◥█          ██"
6180 PRINTTAB(28)"███           ◥"
6190 PRINTTAB(28)"█ TIME USED "
6200 PRINTTAB(28)"█          "
6210 PRINTTAB(28)"█  MIN SEC  "
6220 PRINTTAB(28)"◥█          ██"
6230 PRINTTAB(10)"███↑█████    ██████
██─    ─█"
```

Lines 6000-6230 Display the constant parts of the screen associated with the 3D maze

```
6240 TI$="000000"
```

Line 6240 Sets the internal clock to zero

```
6250 POKE56187,14:POKE1315,160
```

Line 6250 Blanks out the compass pointer to signal that the player has moved the joystick

```
6260 ONDR-1GOTO6300,6330,6380
6270 LN=PEEK(P-1):RN=PEEK(P+1):C1=PEEK(P
-40):LM=PEEK(P-41):RM=PEEK(P-39)
6280 C2=PEEK(P-80):LF=PEEK(P-81):RF=PEEK
(P-79):C3=PEEK(P-120)
6290 LD=PEEK(P-121):RD=PEEK(P-119):MV=-4
0:GOTO6390
6300 LN=PEEK(P-40):RN=PEEK(P+40):C1=PEEK
(P+1):LM=PEEK(P-39):RM=PEEK(P+41)
6310 C2=PEEK(P+2):LF=PEEK(P-38):RF=PEEK(
P+42):C3=PEEK(P+3)
6320 LD=PEEK(P-37):RD=PEEK(P+43):MV=1:GO
TO6390
6330 LN=PEEK(P+1):RN=PEEK(P-1):C1=PEEK(P
+40):LM=PEEK(P+41):RM=PEEK(P+39)
6340 C2=PEEK(P+80):LF=PEEK(P+81):RF=PEEK
(P+79):C3=PEEK(P+120)
6350 LD=PEEK(P+121):RD=PEEK(P+119):MV=40
:GOTO6390
6380 LN=PEEK(P+40):RN=PEEK(P-40):C1=PEEK
(P-1):LM=PEEK(P+39):RM=PEEK(P-41)
```

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•■ KEYBOARD KAPERS ■•

```
6370 C2=PEEK(P-2):LF=PEEK(P+38):RF=PEEK(
P-42):C3=PEEK(P-3)
6380 LD=PEEK(P+37):RD=PEEK(P-43):MV=-1
```

Lines 6260-6380 Examine the maze plan to identify the contents of the local grids in the player's vicinity

```
6390 IFLN=160THEND1=1
6400 IFLN=32THEND1=2
6410 IFRN=160THEND2=1
6420 IFRN=32THEND2=2
6430 IFC1=160ANDLN=32ANDLM=32THEND1=3
6440 IFC1=160ANDRN=32ANDRM=32THEND2=3
6450 IFC1=160ANDP=49270ANDDR=2THEND3=4:D
4=4:D5=6:D6=6:D7=10:GOTO6630
6460 IFC1=160THEND3=3:D4=3:D5=4:D6=4:D7=
3:GOTO6630
6470 IFLM=160THEND3=1
6480 IFLM=32THEND3=2
6490 IFRM=160THEND4=1
6500 IFRM=32THEND4=2
6510 IFC2=160ANDP=49269ANDDR=2THEND5=5:D
6=5:D7=9:GOTO6630
6520 IFC2=160THEND5=3:D6=3:D7=2:GOTO6630
6530 IFLF=160THEND5=1
6540 IFLF=32THEND5=2
6550 IFRF=160THEND6=1
6560 IFRF=32THEND6=2
6570 IFC3=160ANDP=49268ANDDR=2THEND7=8:G
OTO6630
6580 IFC3=160THEND7=1:GOTO6630
6590 IFLD=32ANDRD=32THEND7=5:GOTO6630
6600 IFLD=32THEND7=6:GOTO6630
6610 IFRD=32THEND7=7:GOTO6630
6620 D7=4
```

Lines 6390-6620 Set the display array subscripts to translate the plan view into a 3D display of seven elements

```
6630 PRINT"████████████████████████"TAB
(11)"████"DR$(DR)"█"
```

Line 6630 Displays the compass reading

```
6640 PRINTC$(D7)RF$(D6)LF$(D5)RN$(D4)LN$
(D3)RN$(D2)LN$(D1)
```

Line 6640 Prints the 3D maze display

```
6650 PRINT"████████████████████"TAB(32)PR
"████████"MID$(TI$,3,2)":"MID$(TI$,5,2)
```

Line 6650 Prints the time taken and the number of plan view references

```
6660 IFTI$>=TA$THEN7000
```

Line 6660 If the player's limited time has expired, the game will end

```
6670 IFP=49270THEN8000
```

Line 6670 If the player has succeeded in getting through the maze, the game will end!

```
6680 JV=PEEK(56320):J=1
6690 IF(JVAND1)=0ANDPEEK(P+MV)=32THENJ=2
:GOSUB6740
6700 IF(JVAND4)=0THENJ=2:DR=DR-1:IFDR<1T
HENDR=4
6710 IF(JVAND8)=0THENJ=2:DR=DR+1:IFDR>4T
HENDR=1
```

```
6720 IF(JVAND16)=0ANDFR>0THENGOSUB6770
6730 ONJGOTO6650,6250
```

Lines 6680-6730 The joystick control sequence

```
6740 REM MOVE FORWARD
6750 POKEP,32:POKEP+MV,42:POKEP+MV+1024,
0:P=P+MV
6760 RETURN
```

Lines 6740-6760 The subroutine enabling the player to move forward one position

```
6770 REM FLIP SCREENS
6780 POKE2,200:SYS828:POKE2,192:SYS900:F
ORK=1TO4000:NEXT:POKE2,200:SYS900
6790 FR=FR-1
6800 RETURN
```

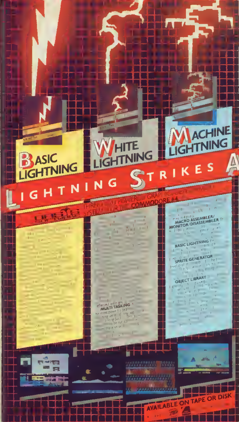
Lines 6770-6800 The subroutine to flip the screen from 3D to plan view and then back to 3D

```
7000 REM*********************************
7010 REM PLAYER FAILS
7020 REM*********************************
7030 DW$=""
7040 FORJ=1TO24:PRINT"██"+DW$+"█
           ":DW$=DW$+"█":NEXT
7050 PRINT"█                          █"
7060 PRINT"█████YOU'VE FAILED"
7070 PRINT"█████ESCAPE FROM THIS MAZE"
7080 PRINT"██IS NOW IMPOSSIBLE;THE"
7090 PRINT"██ONLY EXIT HAS BEEN"
7100 PRINT"██SEALED."
7110 PRINT"████YOUR ONLY CHANCE NOW"
7120 PRINT"██IS TO TRY AND CONQUER"
7130 PRINT"██ANOTHER MAZE !!"
7140 PRINT"████PRESSING THE FIRE"
7150 PRINT"██BUTTON WILL ENABLE"
7160 PRINT"██YOU TO VIEW YOUR"
7170 PRINT"██FINAL POSITION AND"
7180 PRINT"██SELECT THE NEXT MAZE."
7190 POKE50294,2:POKE49270,160
7200 IF(PEEK(56320)AND16)<>0THEN7200
7210 POKE2,192:SYS900:FORJ=1TO8000:NEXT:
GOTO4000
```

Lines 7000-7210 The player fails routine

```
8000 REM*********************************
8010 REM PLAYER SUCCEEDS
8020 REM*********************************
8030 DW$=""
8040 FORJ=1TO24:PRINT"██"+DW$+"█
           ":DW$=DW$+"█":NEXT
8050 PRINT"█                          █"
8060 PRINT"████YOU'VE SUCCEEDED"
8070 PRINT"█████PERHAPS YOU OUGHT TO"
8080 PRINT"██TRY ANOTHER MAZE (AT"
8090 PRINT"██A HIGHER LEVEL ?)."
8100 PRINT"████PRESSING THE FIRE"
8110 PRINT"██BUTTON WILL RETURN"
8120 PRINT"██YOU TO THE LEVEL"
8130 PRINT"██SELECTION SCREEN."
8140 IF(PEEK(56320)AND16)<>0THEN8140
8150 GOTO4000
```

Lines 8000-8150 The player succeeds routine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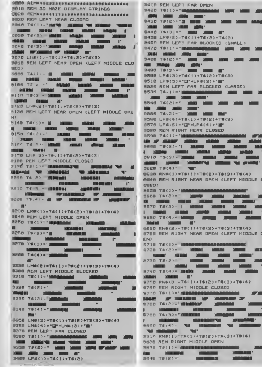
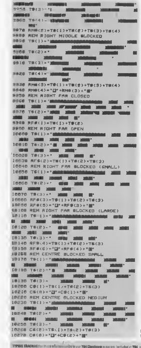
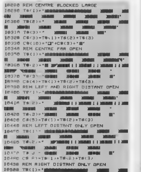


```
9000 REM*********************************
9010 REM 3D MAZE DISPLAY STRINGS
9020 REM*********************************
9030 REM LEFT NEAR CLOSED
9040 T$(1)="[illegible]"
9050 T$(2)="[illegible]"
9060 T$(3)="[illegible]"
9070 LN$(1)=T$(1)+T$(2)+T$(3)
9080 REM LEFT NEAR OPEN (LEFT MIDDLE CLOSED)
9090 T$(1)="[illegible]"
9100 T$(2)="[illegible]"
9110 T$(3)="[illegible]"
9120 LN$(2)=T$(1)+T$(2)+T$(3)
9130 REM LEFT NEAR OPEN (LEFT MIDDLE OPEN)
9140 T$(1)="[illegible]"
9150 T$(2)="[illegible]"
9160 T$(3)="[illegible]"
9170 LN$(3)=T$(1)+T$(2)+T$(3)
9180 REM LEFT MIDDLE CLOSED
9190 T$(1)="[illegible]"
9200 T$(2)="[illegible]"
9210 T$(3)="[illegible]"
9220 T$(4)="[illegible]"
9230 LM$(1)=T$(1)+T$(2)+T$(3)+T$(4)
9240 REM LEFT MIDDLE OPEN
9250 T$(1)="[illegible]"
9260 T$(2)="[illegible]"
9270 T$(3)="[illegible]"
9280 T$(4)="[illegible]"
9290 LM$(2)=T$(1)+T$(2)+T$(3)+T$(4)
9300 REM LEFT MIDDLE BLOCKED
9310 T$(1)="[illegible]"
9320 T$(2)="[illegible]"
9330 T$(3)="[illegible]"
9340 T$(4)="[illegible]"
9350 LM$(3)=T$(1)+T$(2)+T$(3)+T$(4)
9360 LM$(4)="□"+LM$(3)+"■"
9370 REM LEFT FAR CLOSED
9380 T$(1)="[illegible]"
9390 T$(2)="[illegible]"
9400 LF$(1)=T$(1)+T$(2)
9410 REM LEFT FAR OPEN
9420 T$(1)="[illegible]"
9430 T$(2)="[illegible]"
9440 T$(3)="[illegible]"
9450 LF$(2)=T$(1)+T$(2)+T$(3)
9460 REM LEFT FAR BLOCKED (SMALL)
9470 T$(1)="[illegible]"
9480 T$(2)="[illegible]"
9490 T$(3)="[illegible]"
9500 LF$(3)=T$(1)+T$(2)+T$(3)
9510 LF$(5)="□"+LF$(3)+"■"
9520 REM LEFT FAR BLOCKED (LARGE)
9530 T$(1)="[illegible]"
9540 T$(2)="[illegible]"
9550 T$(3)="[illegible]"
9560 LF$(4)=T$(1)+T$(2)+T$(3)
9570 LF$(6)="□"+LF$(4)+"■"
9580 REM RIGHT NEAR CLOSED
9590 T$(1)="[illegible]"
9600 T$(2)="[illegible]"
9610 T$(3)="[illegible]"
9620 T$(4)="[illegible]"
9630 RN$(1)=T$(1)+T$(2)+T$(3)+T$(4)
9640 REM RIGHT NEAR OPEN (LEFT MIDDLE CLOSED)
9650 T$(1)="[illegible]"
9660 T$(2)="[illegible]"
9670 T$(3)="[illegible]"
9680 T$(4)="[illegible]"
9690 RN$(2)=T$(1)+T$(2)+T$(3)+T$(4)
9700 REM RIGHT NEAR OPEN (LEFT MIDDLE OPEN)
9710 T$(1)="[illegible]"
9720 T$(2)="[illegible]"
9730 T$(3)="[illegible]"
9740 T$(4)="[illegible]"
9750 RN$(3)=T$(1)+T$(2)+T$(3)+T$(4)
9760 REM RIGHT MIDDLE CLOSED
9770 T$(1)="[illegible]"
9780 T$(2)="[illegible]"
9790 T$(3)="[illegible]"
9800 T$(4)="[illegible]"
9810 RM$(1)=T$(1)+T$(2)+T$(3)+T$(4)
9820 REM RIGHT MIDDLE OPEN
9830 T$(1)="[illegible]"
9840 T$(2)="[illegible]
```

•█ KEYBOARD KAPERS █•



```
█████    █████    █████    █████"
9050 T$(3)="█    █████    █████    █
█████    █████    █████
9060 T$(4)="█████    █████    █████
    ██"
9070 RM$(2)=T$(1)+T$(2)+T$(3)+T$(4)
9880 REM RIGHT MIDDLE BLOCKED
9890 T$(1)="████████████████    ███
███    █████    █████    █████"
9900 T$(2)="    █████    █████    █
█████    █████    █████    "
9910 T$(3)="█████    █████    █████
    █████    █████    "
9920 T$(4)="█████    █████    █████
    █████    ██"
9930 RM$(3)=T$(1)+T$(2)+T$(3)+T$(4)
9940 RM$(4)="█"+RM$(3)+"█"
9950 REM RIGHT FAR CLOSED
9960 T$(1)="████████████    ███    ███
 ███  ███  ███ ████ ███ ███ ███  "
9970 T$(2)="███  ███  ████ ███ ████
███  ███  ███  ███  █"
9980 RF$(1)=T$(1)+T$(2)
9990 REM RIGHT FAR OPEN
10000 T$(1)="████████████████    ███    ███
 ███  ███  ███  ███  ███"
10010 T$(2)="█  ███  ███  ███  ███  ███
 ███  ███  ███  ███"
10020 T$(3)="  ███  ███  █"
10030 RF$(2)=T$(1)+T$(2)+T$(3)
10040 REM RIGHT FAR BLOCKED (SMALL)
10050 T$(1)="████████████████    ███    ███
 ███  ███  ███  ███  ███"
10060 T$(2)="  ███  ███  ███  ███  ███
███  ███  ███  ███
10070 T$(3)="  ███  ███  █"
10080 RF$(3)=T$(1)+T$(2)+T$(3)
10090 RF$(5)="█"+RF$(3)+"█"
10100 REM RIGHT FAR BLOCKED (LARGE)
10110 T$(1)="████████████████    ██    ██
█  ███  ███  ███  ███  ███"
10120 T$(2)="  ███  ███  ███  ███  ███
███  ███  ███  ███"
10130 T$(3)="  ███  ███  ██"
10140 RF$(4)=T$(1)+T$(2)+T$(3)
10150 RF$(6)="█"+RF$(4)+"█"
10160 REM CENTRE BLOCKED SMALL
10170 T$(1)="████████████████    ████    ███
█    ████    ████    ████    ████    ████"
10180 T$(2)="█    ████    ████    ████    ██
██    ████    ████    ████    ████    ████"
10190 T$(3)="    ████    ████    █"
10200 C$(1)=T$(1)+T$(2)+T$(3)
10210 C$(8)="█"+C$(1)+"█"
10220 REM CENTRE BLOCKED MEDIUM
10230 T$(1)="████████████████    ████    ███
█    ████    ████    ████    ████    ████"
10240 T$(2)="    ████    ████    ████    ███
█    ████    ████    ████    ████    ████"
10250 T$(3)="    ████    ████    █"
10260 C$(2)=T$(1)+T$(2)+T$(3)
10270 C$(9)="█"+C$(2)+"█"
```



```
10280 REM CENTRE BLOCKED LARGE
10290 T$(1)="████████████████    ████    ██
██    ████    ████    ████    ████    ████"
10300 T$(2)="    ████    ████    ████    ███
█    ████    ████    ████    ████    ████"
10310 T$(3)="    ████    ████    ███"
10320 C$(3)=T$(1)+T$(2)+T$(3)
10330 C$(10)="█"+C$(3)+"█"
10340 REM CENTRE FAR OPEN
10350 T$(1)="████████████████    ████    ███
█    ████    ████    ████    ████    ████"
10360 T$(2)="█ ████||████||████||███
████ ████    ████    ████    ████    "
10370 T$(3)="████    ████    ████    █"
10380 C$(4)=T$(1)+T$(2)+T$(3)
10390 REM LEFT AND RIGHT DISTANT OPEN
10400 T$(1)="████████████████    ████    ███
█    ████    ████    ████    ████    ████"
10410 T$(2)="    ████||████||████||███
████    ████    ████    ████    ████    "
10420 T$(3)="████    ████    ████    █"
10430 C$(5)=T$(1)+T$(2)+T$(3)
10440 REM LEFT DISTANT ONLY OPEN
10450 T$(1)="████████████████    ████    ███
█    ████    ████    ████    ████    ████
10460 T$(2)="  ████||████||████||███
████ ████    ████    ████    ████
10470 T$(3)="████    ████    ████    █"
10480 C$(6)=T$(1)+T$(2)+T$(3)
10490 REM RIGHT DISTANT ONLY OPEN
10500 T$(1)="████████████████    ████    ███
█    ████    ████    ████    ████    ████"
10510 T$(2)="██    ████||████||████||
█████ ████    ████    ████    ████    "
10520 T$(3)="████    ████    ████    █"
10530 C$(7)=T$(1)+T$(2)+T$(3)
10540 RETURN
```

Lines 9000-10540 Display strings for the 3D maze

```
11000 REM*********************************
11010 REM MACHINE CODE DATA
11020 REM*********************************
11030 REM SAVE SCREEN & COLOUR RAM TO ME
MORY
11040 DATA169,0,133,251,133,253,169,4,13
3,252,165,2,133,254,162,4,177,251,145
11050 DATA253,200,208,249,230,252,230,25
4,202,208,242,169,216,133,252,162,4
11060 DATA177,251,145,253,200,208,249,23
0,252,230,254,202,208,242,96
11070 REM RETRIEVE SCREEN & COLOUR RAM F
ROM MEMORY
11080 DATA169,0,133,251,133,253,169,4,13
3,252,165,2,133,254,162,4,177,253,145
11090 DATA251,200,208,249,230,252,230,25
4,202,208,242,169,216,133,252,162,4
11100 DATA177,253,145,251,200,208,249,23
0,252,230,254,202,208,242,96
```

Lines 11000-11100 Produce the data for the machine code which flips the screen

TYPING TRAUMAS For those who subscribe to our **Y64 Checksum** program included in **Y64** issue 7, you can write to us for a photocopy of the checksum table you'll need for **3D Maze**. As you can imagine, the checksum table for this program is almost as long as **3D Maze** itself! If you'd like a photocopy of the checksum table for **3D Maze**, send a stamped addressed envelope to 3D maze Checksum, **Your 64**, 14 Rathbone Place, London W1P 1DE. So if typing in listings often damages your sanity, subscribe to the **Y64 Checksum** program and dispel your typing traumas!

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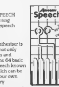
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There ll be a panel of three judges to pick the six finalists Step forward Chris Palmer (star of the home computer keyboard) a well-known personality from the wacky world of commercial software (*OK so we don t know who it ll be yet! Ed*) and our overworked Editor

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ROUTINE STUFF!

In this, the penultimate part of our machine code series, Andrew Bennett takes a close look at the 64 s built-in subroutines

THE COMPLETE Y64

MACHINE CODE TUTOR

This month:

- Multiplication and division by 2
- Addition and subtraction of numbers over $FF
- The last addressing mode
- Kernal routines
- Subroutines

Let s start this month s introduction to machine code by showing you the machine code equivalent of the Basic command GOSUB As you all know GOSUB is short for GOto SUBroutine and is used to jump to a routine that you wish to use several times during your program To save you typing in the routine every time you want to use it you simply GOSUB to the routine (Using subroutines also helps to save memory which even in machine code can be important) When Basic meets a RETURN command it continues executing your program from the statement after the GOSUB that called it It knows where to jump back to because when the GOSUB is executed Basic remembers the GOSUB s line number

We can do a similar thing in machine code using the JSR (Jump to SubRoutine) command JSR takes the form

JSR $0000 (where 0000 can be any four digit Hex number or of course a label)

When the 64 meets a JSR command it remembers whereabouts in memory the JSR is and then transfers to the subroutine At the end of the subroutine the 64 will find an RTS (ReTurn from Subroutine) and transfer back to the point just after the JSR command Have a look at the MACHINE CODE SUBROUTINES box if you don t understand this completely This example also uses a Kernal routine explained later in this article

Subroutines in machine code are just as useful as they are in Basic and you should use them as much as possible You could for example have a subroutine to clear the Hi-res screen which you could call from several different parts of your program

Another command that we should look at here is the JMP (JuMP) command JMP is the exact equivalent of Basic s GOTO command It takes a similar form to JSR

JMP $0000

JMP like GOTO often indicates sloppy programming and should really be planned around if possible by trying to keep the logical flow of your program as a straight line rather than jumping around all over the place

Last month I told you that I d show you how to multiply and divide numbers by 2 Let s look at multiplication first

The multiplication command in machine code works on numbers in a binary format and is called ASL (Arithmetic Shift Left) Arithmetic Shift Left s quite a mouth full, but it simply means that each bit in the number is moved one bit left So that bit 0 becomes bit 1 bit 1 becomes bit 2 etc If you think about it since binary is base two this effectively means that the number is multiplied by 2 — as long as the result is smaller than 255 ($FF) During the ASL operation the 7th bit is moved into the Carry flag You can therefore check the Carry flag to find out if an overflow (Carry) has occurred Using ASL more than once means that the number will be multiplied by the appropriate power of 2 For example using ASL three times will multiply the number by 8, four times by 16 and five times by 32

The different forms of the ASL command can be found on page 236 of the Programmers Reference Guide We ve already looked at all of these addressing modes except ASL A

ASL A is used to multiply the accumulator by two This form is not really a proper addressing mode and can only be used with certain commands (it would be difficult to have LDA A!)

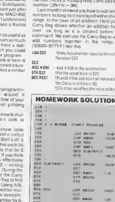
The command to divide numbers by two is quite similar to ASL and is called Logical Shift Right or LSR for short LSR is the exact reverse of the ASL command, because each bit is moved one to the right and the number is divided by 2 In the case of LSR bit zero moves into the Carry flag and can be tested for an underflow (where the result rolls under from $00 to $FF) Successive uses of LSR will cause the number to be divided by 4 8 16 and so on The different forms of LSR are given on page 246 of the Programmers Reference Guide (PRG)

The ASL and LSR commands are examples of machine code commands that have no direct Basic equivalents Using these and the addition/subtraction commands given last month you should be able to multiply or divide any number (in the range $00-$FF) by any other For example to multiply a number (N) by 3 multiply N by 2 and add the original number (2N+N = 3N)

Last month I showed you how to add and subtract numbers as long as they stayed within the $00-$FF range In the case of an addition I told you that the Carry flag shows whether an addition has rolled over as long as it is cleared before the ADC command We can use the Carry flag to allow us to add numbers together in the range 0-65535 ($0000-$FFFF) like this

```
LDA $22       ;Make Accumulator equal to the value of
              ;location $22
CLC
ADC #$08      ;Add #$08 to the accumulator
STA $22       ;Put the result back in $22
BCC REST      ;Branch if the addition has not overflowed and
              ;the Carry is still clear (0)
              ;STA does not effect the value of the Carry
```

HOMEWORK SOLUTION



```
110 ;
120 ;
130 ;
140 ;
150 * = $C000  START ADDRESS
160
170                  LDA $033F     SUBTRACT OR ADD (33F
180                  CMP #$00      ;ZERO IS ADD
190                  BEQ ADD
192                  CMP #$01      ;ONE IS SUBTRACT
194                  BEQ SUBTRACT
196                  RTS           ;RETURN IF NOT SET UP PROPERLY
198 ;
200 SUBTRACT         LDA $033E     ;SUBTRACT 10 FROM 33E
210                  SEC
220                  SBC #$0A      ;10
230                  STA $033E
240                  RTS
250
260 ADD              LDA $033E     ;ADD 10 TO 33E
270                  CLC
280                  ADC #$0A      ;10
290                  STA $033E
300                  RTS
310
```

This here s a program that solves the problem set in Y64 issue 6

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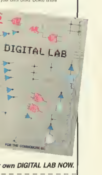

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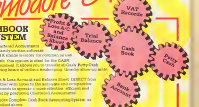

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```
LDA $23     !This part of the program adds one to the Hi
            !part of the number
ADC #$01    !Thereby taking care of the overflow
STA $23
REST         Rest of Program
```

The above example does not by any means show the best method of dealing with overflows during addition of 16-bit (4 Hex digit) numbers In fact it involves a branch instruction that is unnecessary A much better method is

```
LDA $22
CLC
ADC #$08
STA $22     !As before so far
LDA $23     !Notice that the Carry hasn t been cleared this
            !time
ADC #$00    !Add zero to the Hi part of the number
STA $23     !And place the result back into the Hi
```

Only the part of the program that deals with an overflow is changed How have we dealt with the problem of the overflow by adding zero to the hi part of the number? If you remember last month I told you that ADC adds the values of accumulator the argument after the ADC command *and* the Carry flag This is why for most additions the Carry flag must be cleared before the ADC command If an overflow occurred during the addition of the lo part of the 16-bit number then the Carry flag will be set The Carry will then be added to the hi part of the number during the ADC #$00 command thus taking care of the overflow If there was no overflow the Carry will not be set and zero will be added to the hi part of the number The first method is easier to follow but the second is far more elegant

Kernal

We ve already covered jumping subroutines in this part of the machine code tutor Inside the 64 s operating system or Kernal (the programs that keep the 64 running), are several useful subroutines These common subroutines are used by the operating system so that it can fit into as small an amount of memory as possible As machine code programmers we can also call these subroutines in our programs There are subroutines to print characters to a file save or load to disk or tape take input from the keyboard and many others which are not used as often as the above but can be very useful

Each subroutine has its own name and address These can be found on pages 270-306 of the Programmers Reference Guide (PRG) Before you can use a subroutine you must set the Accumulator and the indexes to certain values which are passed to the subroutine These values are outlined in the pages of the PRG mentioned above In this part of the machine code tutor I ll be looking at a few of the Kernal subroutines that I find most useful

The first of these is called CHROUT (*PRG page 278*) which is short for CHaRacter OUT This subroutine prints a character to an open file If however you don t open a file before you use CHROUT the character is printed onto the next available position on the screen CHROUT s address is $FFD2 To use CHROUT you simply set the accumulator to the ASCII value of the required character then JSR to $FFD2 For example

```
LDA #$41
JSR $FFD2
```

Would print A (ASCII 65) on the screen Since ASCII codes are different to screen codes on the 64 you will find that this in fact produces a shifted-A on the screen

To move the next printing position about the screen you can use another Kernal routine PLOT (*$FFF0 PRG p290*) to place the cursor where you wish to print the character To use the PLOT routine you must set the X index to the row number and the Y index to the column number at which you want to print

As well as using CHROUT for printing the normal character set to the screen (or a file) you can also use it to print the other ASCII codes This means that for the first time in machine code you have a very simple method of clearing the screen The ASCII code for clearscreen is 147 Therefore to clear the screen use

```
LDA #$93
JSR $FFD2
```

You must remember that clearing the screen also resets the colour screen so that if you don t reshade it after executing the above any further STAs to the screen won t show up because they ll be in the same colour as the screen

Another very useful Kernal subroutine saves an area of memory to disk or tape and is called not surprisingly SAVE (*$FFD8 PRG p293*) The use of this routine is slightly more complicated than the use of CHROUT or PLOT To use SAVE you must first JSR to two other Kernal subroutines — SETLFS and SETNAM

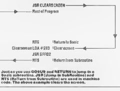
SETLFS (*$FFBA PRG p297*) opens up a file to the cassette or disk (or printer when it is used with CHROUT) on which you can save an area of memory Make the X index equal to the device number before calling SETLFS

SETNAM (*$FFBD PRG p299*) sets the name to be saved on the tape or disk If you are saving to tape you have the option of leaving the name blank This is done by setting the accumulator to zero otherwise the accumulator is set to the length of the name The X and Y indexes are used to point to where you have the name in memory The X index should hold the lo part of the address and the Y index the hi part before you call SETNAM

Now finally you can use the SAVE routine First store the hi and lo parts of the start address of the block of memory that you wish to save in $23 and $22 respectively Make the accumulator equal to the number $22 which is the offset from location zero of the pointer at $22 Now make the X index equal to the lo part of the end address and the Y index equal to the hi part of the end of the block of the area of memory to be saved Now JSR to the SAVE subroutine at $FFD8 If you don t fully understand the above have a look at the SAVING MEMORY TO TAPE program which gives an example of the SAVE subroutine in use

There s also a Kernal subroutine to load an area of memory in from tape or disk This is called LOAD (*$FFD5 PR p286*) and once again SETLFS and

MACHINE CODE SUBROUTINES



```
            JSR CLEARSCREEN
            Rest of Program

            RTS           !Return to Basic
Clearscreen LDA #$93      !Clear screen
            JSR $FFD2
            RTS           !Return from Subroutine
```

Just as you use GOSUB and RETURN to jump to a Basic subroutine JSR (Jump to SubRoutine) and RTS (ReTurn from Subroutine) are used in machine code. The above example clears the screen.

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SETNAM must be used before it Have a look at the LOADING MEMORY FROM TAPE program for an example of the Kernal LOAD subroutine in use

Last time I promised to give you the addresses of the Kernal routines that allow you to convert the contents of the Floating Point Accumulator (FAC) into an integer Using this routine allows you to pass numbers to your machine code programs via the USR commands To use the USR command simply follow these steps

(1) POKE the lo and hi parts of the address of your machine code program into locations 785 and 786 respectively

(2) Use the command such as

```
D = USR (Z)
```

Where Z can have any value from 0 – 65535 Control will now be transferred to your machine code program at the address pointed at by locations 785 and 786 To convert Z so that your machine code program can use it JSR to the conversion routine at $BC9B After you call this routine the lo part of Z will be in location $65 and the hi part will be in $64 ready for use by your machine code program

(3) Before you RTS back to Basic place the lo part of the result in the Y index and the hi part in the accumulator and JSR to a routine at $B391 This subroutine places the result back into the FAC

(4) RTS to Basic and now D will hold the result from your machine code program

USR can be a very useful method of passing numbers between Basic and machine code but it is often easier simply to POKE the number into a location and have your machine code program get the number from that location

We'll finish this month by looking at the last of the addressing modes that the 64's processor (the 6510) offers This addressing mode is called Indexed Indirect I must admit I've never used this mode in my own machine code programs because its use is quite limited You should however keep it in mind just in case you find a case where it might be very useful It has the form

```
LDA ($22 X)
```

In the above case the accumulator is loaded with the value of the location which is pointed at by a lo-hi pointer starting at $22+X Confused? Here's an example which should help to make things clear

```
LDA #$00
STA $22
LDA #$01
STA $24
LDA #$04
STA $23
STA $25
```

In the above the lo-hi pointers $22/$23 and $24/$25 are initialised to point at $0400 and $0401 the top-left and one to the right of top-left of the screen

```
LDX #$00
LDA #$02   'B
STA ($22 X)
```

If X is zero then 'B' is placed in the top-left of the screen and if X were 2 then 'B' would appear one character to the right of top-left

Using this mode lets you set up a table of pointers in zero page but there isn't really enough room in zero page for a large table so as I've already said this mode isn't all that useful

Conclusion

With only one part of the Machine Code Tutor remaining you should be feeling confident with machine code and be ready to experiment Next month we'll wrap everything up and I'll show you how to plan a long machine code program

In the meantime if you've got any questions about the course send them in to me and I'll answer them in a follow-up article (please enclose an sae if you'd like a personal reply also)

Homework

This month's homework is to test that you've understood this month's section about the 64's Kernal routines During the next month I want you to write a program that puts your name on the screen in 6 different places Clue you should use a subroutine to print your name using CHROUT and a loop that moves the cursor about the screen using PLOT Not too difficult really — answer next month

Next month:

- More bit manipulation commands
- How to plan your machine code programs
- What have we learnt?
- The Y64 Machine Code Tutor ends next month

SAVING MEMORY TO TAPE

```
10 ;PROGRAM 2.1   SAVE TO TAPE
20 ;
30 ;
100 * = $C000
105 ;
110 SETLFS        = $FFBA ;SET UP LABELS
120 SETNAM        = $FFBD
130 SAVE          = $FFD8
140
145           LDY #$FF  ;NO SECONDARY ADDRESS
148           LDA #$01  ;LOGICAL FILE NUMBER = 1
150           LDX #$01  ;TAPE = DEVICE NUMBER 1
160           JSR SETLFS
165 ;
170           LDA #$00  ;NO FILE NAME   TAPE SAVE
180           JSR SETNAM
185 ;
190           LDA #$00  ;LO PART OF START ADDRESS
200           STA $22
210           LDA #$70  ;HI PART OF START ADDRESS (=$7000)
215           STA $23
220           LDX #$00  ;LO PART OF END ADDRESS
230           LDY #$71  ;HI PART OF END ADDRESS ($7100)
240           LDA #$22  ;OFFSET FOR START ADDRESS
250           JSR SAVE
260 ;
270           RTS
280 ;
310 ;
320 ;THE ABOVE PROGRAM SAVES AN AREA OF MEMORY
    ($7000 $7100) TO TAPE WITH
330 ;NO FILE NAME.
340 ;
```

LOADING MEMORY FROM TAPE

```
100 ;PROGRAM 2   LOAD
110 ;
120 ;
130 ;
140
150 * = $C000
160 ;
170 ;DEFINE LABELS
180 ;
190 SETLFS        = $FFBA
200 SETNAM        = $FFBD
210 LOAD          = $FFD5
220 ;
230           LDA #$01          ;FILE NUMBER = 1
240           LDX #$01          ;TAPE DEVICE = 1
250           LDY #$01          ;NOT A RELOCATED LOAD
260           JSR SETLFS
270 ;
280           LDA #$00          ;NO FILE NAME
290           JSR SETNAM
300 ;
310           LDA #$00          ;LOAD NOT VERIFY
320           JSR LOAD
330 ;
340           RTS
350
360
370 ;THE ABOVE PROGRAM LOADS THE NEXT
380 ;PROGRAM FROM TAPE
390
```

The two programs above show how you can make use of the Kernal subroutines in your own programs the top listing shows the Kernal SAVE subroutine in action the one at the bottom includes the Kernal LOAD subroutine

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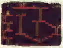
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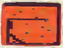
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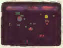
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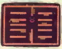
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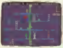
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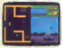
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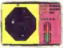
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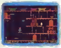
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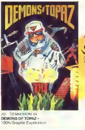
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